

**The association between depression and self-perceived oral health in migrants of Russian, Somali and Kurdish origin living in Finland: a population based study.**

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## Abstract

**Background:** Scientific literature shows a bi-directional association between depression and poor oral health. However, studies conducted among migrants are not available. This study examines the association between depression and self-reported oral health among Russian, Somali and Kurdish migrant populations in Finland.

**Methods:** Data from the cross sectional Finnish Migrant Health and Wellbeing Study was utilized. The participants were persons of Russian, Somali and Kurdish origin aged 18-64 years living in Finland. Depressive symptoms were assessed using the Hopkins Symptom Checklist (HSCL-25). Oral health measures included self-estimated oral health status, need for oral health care and dental /denture problems in the last 12 months. The data were analysed separately for men and women using logistic regression.

**Results:** After adjusting for relevant socio-demographic and health factors, depressive symptoms were positively associated with poor oral health among Russian men odds ratio (OR) 8.10 (95% confidence interval, CI, 2.05-32.05), Kurdish men OR 1.69 (95% CI 1.09-2.85), and Kurdish women OR 2.07 (95% CI 1.20-3.57). Depressive symptoms were positively associated with need for dental care among Russian men OR 7.32 (95% CI 1.68-32.14), Kurdish men OR 1.72 (95% CI 1.00-2.98) and Kurdish women OR 2.19 (95% CI 1.26-3.83).

Depressive symptoms were positively associated with having had dental or denture problems in the last 12 months only among the Kurdish women OR 1.73 (95% CI 1.05-2.84). No significant associations were found among the Somalis.

**Conclusion:** The association between depressive symptoms and poor oral health varies among different migrant populations, being strongest in the Kurdish population.

**Key words:** depression, oral health, mental health, migrant

## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. LITERATURE REVIEW.....</b>	<b>3</b>
<b>2.1 An overview of migration and health</b>	
2.1.1 Historical perspectives on migration and health.....	4
2.1.2 Current issues in migration and health.....	5
2.1.3 Migration and migrants' health in Finland.....	8
<b>2.2 Mental Health</b>	
2.2.1 Definitions and concepts in mental health.....	10
2.2.2 Burden of depressive disorders.....	12
2.2.3 Risk factors for depression.....	13
2.2.4 Consequences of depression.....	14
2.2.5 Depression and other mental disorders among migrants.....	16
<b>2.3 Oral Health</b>	
2.3.1 Definitions and concepts in oral health.....	19
2.3.2 Burden of oral diseases.....	20
2.3.3 Risk factors for oral health diseases.....	21
2.3.4 Consequences of poor oral health.....	22
2.3.5 Oral health patterns in migrant populations.....	23
<b>2.4 Associations between mental health and oral health</b>	
2.4.1 Suggested mechanisms of relationships between mental health and oral health.....	26
2.4.2 Association between severe mental illness and poor oral health.....	29
2.4.3 Association between depressive symptoms and poor oral health....	30
2.4.4 Relevant modifiers of the mental health – oral health association...	34
2.4.5 Association between depressive symptoms and poor oral health among migrant populations.....	35
<b>3. ACKNOWLEDGEMENTS.....</b>	<b>36</b>
<b>4. REFERENCES.....</b>	<b>37</b>
<b>5. ARTICLE MANUSCRIPT.....</b>	<b>51</b>
<b>6. APPENDICES.....</b>	<b>77</b>

## **ABBREVIATIONS**

WHO - World Health Organization

IOM - International Organization for Migration

mhGAP - Mental Health gap action program

DALY- Disability Adjusted Life Years

YLD -Years lived with disability

BMI - Body Mass Index

HCL-25-Hopkins Checklist for Depression

Maamu - Migrant Health and Wellbeing Study

## 1. INTRODUCTION

Mental health is a leading subject of interest globally (Steel et al., 2014). Poor mental health is a noteworthy cause of disability, lost income and years lived with disability (Ustun, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004). Poor mental health refers to a wide scope of mental illnesses ranging from severe psychotic and mood disorders such as schizophrenia, to common mental disorders such as depression, which often occurs in its mild forms (Goodwin, 2006). However, poor mental health, in many cases, does not occur alone, but is associated with other equally challenging disease conditions, compounding the health burden in the individuals affected (Buist-Bouwman et al., 2005).

Poor oral health on the other hand, generally indicates a wide scope of oral diseases, which include dental caries and periodontal disease (Batchelor, 2014; Petersen, 2008). The inevitable unenviable end result of untreated oral disease is usually tooth loss, with its attendant handicaps such as reduced masticatory efficiency, speech impairment and compromised aesthetics (Benjamin, 2010; Jackson et al., 2010).

As indicated previously, poor mental health has been associated with several chronic disease conditions. The link between mental health and cardiovascular disease especially coronary heart disease has been emphasized in several studies (Gump, Matthews, Eberly, Chang, & MRFIT Research Group, 2005). Other diseases which have been linked with poor mental health include chronic pulmonary disorders, arthritis, diabetes and some forms of cancer (Anderson et al., 2001; Barth et al., 2004; Gump et al., 2005; Kessler & Bromet, 2013).

As regards the association between mental health and oral health, much less attention has been paid to it previously (Kisely, 2016). However, there has been an increase in interest in this area of study in recent times. Severe cases of poor mental health such as schizophrenia, dementia and others have been linked to poor oral health (Chu et al., 2010; Kebede et al., 2012; Kisely et al., 2015; Luo et al., 2015; Wey et al., 2016). Associations between depression and poor oral health have also been the object of intense research. Depression has been linked with toothache in Korean adults (Park et al, 2014), gum bleeding among Portuguese students (Marquo-Vidal Milagre, 2006), tooth loss among US adults (Okoro et al, 2012) and pregnant women (Silveira et al, 2016) respectively. In

Finland, depression was associated with decayed teeth among Finnish adults (Delgado-Angulo et al., 2015).

Despite the various studies which have been conducted to show the association between poor mental health and poor oral health, an important part of the population, migrants, is yet to be studied. Migration is known to be an adverse life event which may have untoward effects on mental health (Berry, Kim, Minde, & Mok, 1987). Scientific evidence suggests that migrants have poor mental health compared to similar peers in the host country (Bhugra & Ayonrinde, 2003; Lassetter & Callister, 2009). Furthermore, multilevel analyses of immigrants and ethnic minorities in 23 European countries show that prevalence rates of depressive symptoms are higher for immigrant and ethnic minority groups than natives in a substantial part of the European countries (Missinne & Bracke, 2012).

Migrants have also been shown to be at a higher risk of poor oral health due to multi-level barriers which they encounter such as poor finances, lack of dental insurance and language difficulties (Manandhar, 2014). These account for the low utilization of oral health services widely observed among migrants (Mastaki., 2014; Denise et al, 2012; Stronks, Ravelli, & Reijneveld, 2001).

Migrants make up an important and unique proportion of the population of their host countries and it is necessary to study this unique group as they make up an increasing population in their host country and do contribute to the general background health statistics of their host country. It is also important to understand more about the health needs of this particular group to provide more efficient health care for the entire population (which includes migrants). To this end, this study aims to examine the association between depression and poor oral health among migrants of Russian, Somali and Kurdish origin living in Finland.

## **2. LITERATURE REVIEW**

### **2.1. An overview of migration and health**

The International Organization for Migration defines a migrant as “any person who is moving or has moved away from his / her habitual place of residence, regardless of (1) the person’s legal status; (2) whether the movement is voluntary or involuntary; (3) what the causes for the movement are; or (4) what the length of the stay is” (IOM, 2016). Migration is a phenomenon that is observed quite commonly among humans and animals alike. Both humans and animals migrate in search of greener while some animals also migrate for mating. People will often migrate in times of famine, drought, or war, or threat to life. Migration could occur for the purpose of business, trade or pleasure.

In historical times, people have migrated for economic, business, and religious reasons. Migration also took place with the purpose of conquering and subduing other groups of people. The infamous trans- Atlantic slave trade that took place from the middle of the 15th century to the end of the 19th century saw the forced migration of 12-15 million people from Africa to the Western Hemisphere (Olaudah, 2006; Encyclopaedia Britannica, 2017). A similar pattern of conquest and forced migration is recorded in the Bible where Jerusalem was besieged, invaded, conquered, and human spoils of war forcefully taken away (Daniel 1:1-3).

While the above patterns of migration remain in the archives of history, migration continues to this day, with many similar reasons. People continue to migrate voluntarily for various reasons: for education, in search of a better life, for marriage or for work or even recreation and tourism. In discussing about migration, the push and pull factors come into play. Push factors are those that drive people to leave their countries of origin. These could be economic, social or political problems. Pull factors are the desired factors, which pull people to their destination countries of choice (IOM, 2016).



Howbeit, forced migration continues to go on. People are forced to migrate due to persecution, conflict, generalized violence, natural disasters, human trafficking and human rights violation. In the year 2015, the United Nations High Commissioner for Refugees reported that worldwide displacement was at the highest level ever recorded (UNHCR, 2015).

#### 2.1.1. Historical perspectives on migration and health

The World Health Organization, which is the directing and coordinating authority on international health, defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization, 1946). This definition is generally accepted worldwide as the standard definition of health.

Historically, migration and health have always been significantly intertwined. In the 1500s, European immigrants to North America brought with them non-native germs and diseases to which the native populations had no immunity. This had disastrous consequences for the native population as it led to widespread death and consequent decimation of the population within a short while from 20 million to about 1 million. It is on record that germs killed more people than guns did (Diamond, 1997).

Similarly, malaria, a mosquito borne infectious disease, which is endemic to parts of sub-Saharan Africa, Asia, the Amazon basin and other tropical areas, was greatly facilitated in its spread to Rome, Europe, and the Americas by traders, colonists, soldiers, and merchants in the 1400s and early 1500s. As the migrants travelled along, they often carried the causative agents for this disease as microscopic cargo. The native populations had some measure of resistance to malaria through genetic defenses and partial immunity gained through life long exposure. However, malaria often proved fatal for the immigrants, resulting in crippling economic and political consequences (Institute of Medicine (US) Committee on the Economics of Antimalarial Drugs, 2004).

Nowadays, mobile populations continue to connect areas of disease emergence with low prevalence or non-endemic areas (Gushulak, Weekers, & Macpherson, 2009). Well-known examples of this are Ebola fever, Lassa fever, yellow fever and the SARS virus.

The health of migrants continues to be of significant concern to international mobility. Some countries like Australia, Canada, New Zealand and the United States have required the overseas health screening of long-term visitors for decades. In 2005, the United Kingdom announced a new pre-entry immigration screening for tuberculosis for migrants from Bangladesh, Sudan, Thailand and the United Republic of Tanzania (World Health Organization, 2005). However, the ethical justification of compulsory screening of migrants has been widely debated (Weekers & Siem, 1997).

The increasing interest in migrant health has heightened the need for new health science disciplines to cater for the health needs of migrants. Hence, travel medicine was established in 1991 to provide several subspecialties of preventive and curative medicine for international travelers including migration medicine, among others. It provides information to travelers about significant diseases in the destination country and measures to prevent them. A multidisciplinary team consisting of travel medicine physicians, nurses, academia, as well as volunteers work together in this area (International Society of Travel Medicine, 2016).

Having explained the historical background of migration, we then consider current issues in migration and migrant's health.

### 2.1.2 Current issues in migration and health

In recent times, emphasis has been shifting from the impact of migrants' health on the host communities to the health of migrants themselves, taking into consideration the pre-migration experiences they have had. More attention is being paid to the health of migrants in their host communities considering that their health contributes significantly to public health by adding to the prevalent burden of chronic and infectious diseases such as tuberculosis and hepatitis, and modifying patterns of pre-existing immunity (Gushulak et al., 2009).

In studying migrants' health, it is important to acknowledge the various exposures to poor health which migrants face. Possible negative pre-migration experiences include violence, unemployment, instability and poor access to health services. In transit, physical hazards (e.g. at sea or in the desert) and poor health could occur. In the new country, other

factors that could affect health negatively include poverty due to unemployment, poor access to health services, or emotional ill health from negative asylum decisions, discrimination or lack of integration into the host society (Bhugra & Ayonrinde, 2003; Bhugra & Gupta et al, 2011).

A number of hypotheses have been generated to describe and explain the health of migrants - whether good or poor health. These include the healthy migrant hypothesis and the acculturation hypothesis. Other concepts include the salmon bias or the return migration bias and the unhealthy remigration effect. These are described in more detail below.

The healthy migrant hypothesis proposes that people who voluntarily migrate are typically in better health than their counterparts born in the host destinations or their non-migrating peers in their places of origin. The healthy migrant hypothesis puts this disparity down to selection bias in migration as only the healthiest people migrate. It proposes that individuals who migrate are more likely to have healthier lifestyles and less chronic diseases than people who do not choose to migrate (Argeseanu Cunningham, Ruben, & Narayan, 2008; Fuller-Thomson, Brennenstuhl, Cooper, & Kuh, 2016).

Several studies among voluntary migrants to Western societies support the healthy migrant hypothesis. Evidence for the healthy migrant hypothesis is supported by low mortality rates, higher life expectancy, better birth outcomes and lower risk of illness observed among migrants (Lassetter & Callister, 2009). In addition, studies among Hispanics in the US show that US Hispanics tend to outlive non-Hispanic whites by several years (Scommegna, 2013). Furthermore, a British birth cohort study found that emigrants had better childhood health (especially higher height), higher childhood socio-economic position and better childhood cognitive ability at age 8 than non-migrants (Fuller-Thomson et al., 2016).

However, the healthy migrant effect may be distorted by other phenomena such as the salmon bias and the unhealthy remigration hypothesis. Drawing on the peculiar nature of adult salmon to return to their birthplaces on the completion of their life spans to die, the salmon bias effect refers to the tendency of migrants to return to their places of origin

after temporary employment, retirement or becoming seriously ill; reflecting the desire to die in one's birthplace (Lassetter & Callister, 2009).

In the same vein, the unhealthy remigration effect describes the tendency of migrants with health challenges to return to their places of origin to seek treatment for their ailments (Lassetter & Callister, 2009). This could also apply to unsuccessful migrants with a higher mortality risk moving back to their countries even before the illnesses manifest (Razum, Zeeb, Akgun, & Yilmaz, 1998). This concept has been described elsewhere as the selective reverse migration hypothesis (Fuller-Thomson et al., 2016).

Closely related to this is the concept of transnational health resources: a situation in which immigrants prepare for migration by stocking prescription drugs from their home country, or sending for them from the home country rather than seeking professional health care in their host country. They may also delay seeking health care pending when they are able to go back to their home country. The reasons for these actions include lack of health insurance, information and knowledge barriers as well as feelings of not being understood by the health care providers (Messias, 2002). The concepts of salmon bias, unhealthy remigration effect and transnational health resources produce artificially low mortality and morbidity rates among resident migrants, and do not present the true picture of their state of health.

Evidence for poor health among migrants equally exists. Poor health among migrants is observed when examining patterns of deteriorating health, self-rated health, coronary heart disease, higher body mass Index (BMI), high blood pressure, and depression (Lassetter & Callister, 2009). The acculturation hypothesis proposes that the longer migrants from cultures with protective health practices live in Western host countries and adopt the unhealthy cultural practices of their host countries communities, the more they experience deteriorating health (Franzini & Fernandez-Esquer, 2004). In addition, in their host country, migrants are often a minority with lower socio economic status than the general population, encounter chronic stress, higher unemployment rates and health risks. These further worsen their health (Razum et al., 1998). Other researchers suggest that migrants who are unsuccessful in their place of origin and migrate out of desperation are often not in good health (Messias & Rubio, 2004).

However, these hypotheses are not set in stone. Complex interactions between ethnicity, acculturation and economic factors determine social and personal strengths and their influences on health (Franzini & Fernandez-Esquer, 2004). Language, culture similarity and the types of migrants in question would also affect the validity of the acculturation hypothesis: one size does not fit all. For example, skilled workers are well received by their host communities whereas refugees, asylum seekers and immigrants from a lower socio economic status may be seen as a drain on the country; hence they may face more discrimination and may resist acculturation (Schwartz, Unger, Zamboanga, & Szapocznik, 2010). Acculturation may have varying results on health: Latinos in the US exhibit a lower mortality rate compared to non- Latino whites. However, higher acculturation was increased with worsening of some health behaviors (alcohol consumption, smoking and higher BMI) but was associated with improvement in exercise (Abraido-Lanza, Chao, & Florez, 2005).

In another study conducted to test the salmon bias and healthy migrant hypothesis, researchers found that neither salmon bias nor the healthy migrant hypothesis were plausible explanations for the superior health of Latinos compared to the non-Latino whites living in the US. Rather, they concluded that differences in health behaviors such as lesser prevalence of smoking and alcohol consumption were accountable for better health in that study group (Abraído-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999).

The above concepts, which supposedly underlie migrant health, continue to be widely discussed. However, the main public health goals of migrant health are 1.) Avoiding disparities in health status and access to health services between migrants and the host population. 2.) Ensuring migrants health rights. 3.) Limiting discrimination or stigmatization. 4.) Removing impediments to migrants' access to preventative and curative services. Advocacy, research, capacity building and service delivery are strategies that are needed to improve migrant health (WHO, 2007).

### 2.1.3 Migration and migrants' health in Finland

Finland is a developed European country with a population of about 5.4 million in the so-called geographical north situated on the eastern border of Europe next to Russia. Hence, most migrants to Finland are from the neighboring areas such as Russia and the Baltic

countries such as Estonia who have migrated for work, marriage and as returnees -having Finnish ancestors (Jasinskaja-Lahti, 2000; Malin & Gissler, 2009).

Finland was a country of net emigration until the 1900s. Mass migration into Finland and hence multiculturalism of Finland began mainly at the end of the 20<sup>th</sup> century due to collapse of the Soviet Union in 1991, remarkable increase in non-Western refugees during the past decades as well as enlargement of the European Union (Malin & Gissler, 2009).

The number of migrants of foreign origin with a foreign mother tongue living in Finland has increased steadily since the 1980s (Statistics Finland, 2012) and the proportion of foreign citizens living in Finland has grown from 0.8 to 6.2% during the years 1990-2015 (Statistics Finland, 2017). The number of persons speaking a foreign language other than Finnish or Swedish (the official languages in Finland) living in Finland at the end of 2016 is estimated at 353,993, the biggest foreign language groups being Russians, Estonian, and Arabic respectively (Statistics Finland, 2017). According to recent studies, the most important reason for foreigners aged 15-64 years born abroad migrate to Finland is for family reasons (54%); other reasons are jobs (18%), refugee or asylum seekers (11%), and study 10%. Other persons with other reasons make up 8% (Sutela, & Larja, 2015).

Given the marked rise in the number of migrants living in Finland, it is important to study migrants' health in Finland not only for public health reasons, but also for integration of migrants into the communities, promotion of employment and enhancement of wellbeing of migrants in Finland.

Generally, migrants have equal access to public health care in Finland but information about the health of migrants in Finland is still limited. The Finnish Migrant Health and Wellbeing (Maamu) study that provides data for this research was the first large scale comprehensive health examination survey among migrants in Finland. It was conducted in 2011-2012. Its subjects were migrants of Russian, Somali and Kurdish origin living in Finland aged 16-64. It involved comprehensive physical health examinations, interviews, oral health examinations, anthropometric measurements, and blood investigations involving hemoglobin concentrations, assays for chronic disease risk factors (glucose, glycated hemoglobin, and cholesterol among others). It also involved mental health assessments of anxiety, depression and psychosomatic symptoms.

Some smaller studies among migrants have been conducted in Finland. They largely show cultural differences in the migrants' health experiences. For example, one study among adult Somali men in Finland reported that mental health problems and depressive symptoms were attributed to a variety of causes, ranging from spiritual causes to jealousy in polygamous relationships (Kuittinen, Mölsä, Punamäki, Tiilikainen, & Honkasalo, 2017). Another study of pregnant immigrant women reported that differences in culture and communication on the part of the health care professionals were cited as having affected their health care experience adversely; even though the women praised the quality of the care they received (Juslén, 2012).

The 2014 survey of work and wellbeing among people of foreign origin, among other measures, assessed the health and wellbeing of foreign origin living in Finland, as well as their perceived opinion of the health care system, social welfare support, the judicial system and the police. It found out that negative experiences related to insecurity were highest among the population with a refugee background and least common in work related immigrants. The study concluded that measures to protect the mental health of people of foreign origin living in Finland are needed (Castaneda et al, 2015).

## **2.2 Mental Health**

### **2.2.1. Definitions and concepts in mental health**

#### *Mental Health*

One major issue of public health that often goes unrecognized is the issue of mental health. The World Health Organization defines mental health as, “a state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to her or his community. It is more than merely the absence of mental disorders” (WHO, 2014). This definition is generally acceptable worldwide and is applicable to European countries, including the Finnish Association for Mental Health (FAMH)-the health authority for mental health in Finland.

### *Mental disorders*

Mental disorders is a broad term used to describe a wide range of mental health conditions, which affect emotional and cognitive functioning. They include mood disorders such as depression, and psychotic disorders such as schizophrenia. (McCollam et al., 2008). Common mental health disorders prioritized by the WHO Mental Health Gap Action Program (mhGAP) are depression, psychosis, epilepsy, child and adolescent mental and behavioral disorders, alcohol and substance disorders, disorders caused by substance abuse, and self-harm/suicide (WHO Mental Health Gap Action Programme, 2016).

### *Depression*

On a broad note, depression may refer to either a mental disorder or simply an emotion. As an emotion, it can just be a transient emotional feeling due to a specific unfavorable reason, which has occurred as a normal part of life's day-to-day activities. For example, losing a job, a loved one or some other disappointment. These feelings are transient, and may actually be beneficial to people's self-development. This form of depression requires no treatment (The Finnish Association for Mental Health, 2017).

On the other hand, when depression refers to a mental disorder, it involves lowering of moods for a long time, and changes in feelings, thoughts, behavior and the entire body. Depression may be categorized into mild, moderate or severe, depending on the degree and intensity of the symptoms. People with depressive disorders may exhibit characteristics such as depressed mood, loss in interest in things, fatigue, fatigue, loss of confidence, feelings of worthlessness and needless self-blame and guilt, suicidal thoughts or self-destructive behavior, feelings of indecision, psychomotor retardation, sleep disorders, and changes in appetite or body weight (The Finnish Association for Mental Health, 2017).

The World Health Organization defines depression as, "Multiple persistent physical symptoms with no clear cause, low energy, fatigue, sleep problems, persistent sadness or depressed mood, anxiety, loss of interest or pleasure in activities that are normally pleasurable" (WHO, 2016). People with mild depressive symptoms may encounter some difficulties with regular day-to-day activities but can continue to function nonetheless. However, a person who is severely depressed would be too severely handicapped to



continue with regular activities of daily living except to a very limited extent. Depressive symptoms may occur alongside mania (elevated or irritable mood). In such a case, the subject swings between episodes of depression and mania, periodically relieved by times of normal mood. This condition is known as bipolar affective disorder (WHO, 2017a).

### 2.2.2 Burden of depressive disorders

Mental disorders occur very commonly globally. Results of systematic and meta-analysis studies drawing from 155 general population surveys, across 59 countries report that one in five persons experience a common mental disorder within a period of 12 months (Steel et al., 2014).

The prevalence of common mental disorders varies across regions; high income countries report a higher burden (twice as high) than is reported in low income countries (Ustun et al, 2004), while countries of North and South East Asia have lower prevalence estimates compared to countries in other regional groupings (Steel et al., 2014). In the European Union, mental health disorders are common, accounting for the highest suicide rates (WHO Regional Committee for Europe, 2013).

Depression is a very common mental health disorder, which often occurs in its mild forms; hence, it is referred to as the ‘common cold’ of psychiatry (Goodwin, 2006). It is estimated that more than 300 million people across all ages worldwide undergo some form of depression (WHO, 2017a). The global burden of depression is increasing and the WHO predicts that by 2020, it will be the second most important cause of disability (Kessler & Bromet, 2013).

Depression is a major cause of disability globally, hence its prominent public health significance. Reports of a systematic review found depression to be the fourth most important cause of global burden of disease worldwide in the year 2000, as it accounted for 4.4% of total disability adjusted life years (DALY) and nearly 12% of total Years Lived with Disability (YLD) (Ustun, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004).

A 12-month prevalence study conducted in Finland in an 11-year follow up study reported a notable rise in the prevalence of depressive disorders among the general Finnish population from 7.3% in 2000 to 9.6% in 2011 (Markkula et al., 2015). Suicide rates in Finland continue to be one of the highest in the Organization for Economic Co-operation and Development (OECD) countries, recent evidence reporting suicide rates of 14.1 per 100,000 persons (OECD, 2017).

In all the OECD countries, antidepressant use has been on the rise and Finland is not left out. In 2010, 8.3 % of the entire Finnish population were prescribed antidepressants. However, it is unclear whether this rise in antidepressant use is due to over prescription or other factors (Vilhelmsson, 2013).

However, researchers find that the true burden of depression and mental disorders in general is underrated due to lack of data in some parts of the world. There is a tendency for descriptive epidemiologists to use no data instead of estimates where data is not available. This leads to underestimation and thus the true burden of disease may be higher (Ustun, et al., 2004; Vigo, Thornicroft, & Atun, 2016). In addition, depression tends to be undertreated; In addition, depression tends to be undertreated; studies in Finland show that only about one third of people who suffer from depression are actually treated for it (Lehtinen & Joukamaa, 1994).

As previously stated, depression occurs very commonly. Hence, it is important to note the factors that may predispose an individual to depression. Studies have shown specific trends in prevalence of depression. These predisposing factors for depression are discussed in the next section.

### 2.2.3. Risk factors for depression

Depression generally results from a complex interaction of social, psychological and biological factors. Adverse life events such as unemployment, bereavement and psychological trauma may predispose an individual to depression. Societal changes such as economic recession could also lead to negative mental health outcomes (Stuckler, Basu, Suhrcke, Coutts, & McKee, 2009). In a vicious cycle, depression then leads to further deterioration of the person's condition due to increased stress and inability to cope.

Factors found to be related to depression have been explored in several studies and include female gender, young and old age, loneliness/single marital status, unemployment and belonging to a lower socio economic class. These are explained in detail below.

Extensive research has shown there are significant gender differences between men and women in the prevalence of depression. A comprehensive systematic review of all published and non-published studies on depressive disorders from all parts of the world showed that depression was the fourth leading cause of disease burden in women but ranked seven for men (Ustun et al, 2004). Another study on gender differences in 23 European countries showed that depression occurs twice as much in women as it occurs in men (Van de Velde, Bracke, & Levecque, 2010). Studies in Finland show similar results (Markkula et al., 2015).

The correlation between age and depression varies widely. Some researchers found an almost linear rise association between increasing age and depression (Stordal, Mykletun, & Dahl, 2003), while other researchers demonstrated depression peaking among the elderly 80 years and above (Mirowsky & Ross, 1992). However, studies in Finland demonstrate a higher prevalence of depression among the youngest age group in the study (30-44 years) (Markkula et al., 2015). Among immigrants from the Soviet Union to Israel, higher prevalence of depressive disorders was found among the elderly aged above 65 years (Zilber, Lerner, Eidelman, & Kertes, 2001).

Depression rates are higher among widowed, single or people in common law relationships than among married people (Lehtinen & Joukamaa, 1994; Markkula et al., 2015; Zhang & Li, 2011). In addition the above factors, lower socioeconomic class and lower income plays an important role in depression in Finland (Lehtinen & Joukamaa, 1994; Torikka et al., 2014), in other European countries (Freeman et al., 2016), and in other parts of the world.

#### 2.2.4. Consequences of depression

Depression has several adverse and far-reaching consequences for the victims themselves, their families, and the society. In its more severe forms, it can have adverse effects on milestones of life such as termination of education. Depression is associated

with low probability of ever getting married, divorce, marital dissatisfaction and discord, and negative parenting behaviors. It can be a risk factor for job loss, especially where complex high demanding jobs are involved leading to unemployment, reduced work performance and diminished financial earnings (Kessler & Bromet, 2013).

In Finland, depression has been a major issue of concern because Finland has one of the highest suicide rates in the OECD countries. Although suicide rates have steadily fallen in the last decade, suicide rates remain high; in 2013, the suicide rate per 100,000 population was 15.8, with particularly high prevalence among the males (OECD, 2017).

Depression and other forms of mental health disorders have huge impacts on the economy because of lost productivity and financial costs of treatments (Kessler et al., 2009). Reports show that mental disorders account for 43% of social welfare benefits and disability pensions in Finland (WHO Regional Committee for Europe, 2013). In addition, the incidence of disability pensions based on depressive disorders increased in Finland until the late 2000s (Markkula et al., 2015).

Depressive symptoms may take a toll on the physical health of the affected persons, further compounding their health problems. Previous research has established that people with depression and other mental disorders often have worse physical health than those who do not suffer from it leading to physical-mental comorbidity (Buist-Bouwman, de Graaf, Vollebergh, & Ormel, 2005). Poor physical health observed among persons with depression may be as a result of poor health behaviors like elevated rates of smoking and drinking, obesity, low compliance with treatment regimens and biological dysregulations such as hormonal imbalance and impaired immune function (Kessler & Bromet, 2013).

Recently, researchers have shown an increased interest in the association between depression and physical health especially cardiovascular disease. Meta analytic studies of prospective studies found depression as a risk factor for mortality in patients with coronary heart disease (Barth, Schumacher, & Herrmann-Lingen, 2004). Another study among men shows depressive symptoms as a risk factor for cardiovascular disease mortality (Gump, Matthews, Eberly, Chang, & MRFIT Research Group, 2005).

In addition, depression has been associated with diabetes and prostate cancer. A meta-analysis of 42 studies showed that the presence of diabetes doubled the odds of comorbid depression (Anderson, Freedland, Clouse, & Lustman, 2001). Elsewhere, a 24 year follow-up population study found a significant positive association between a history of depression and prostate cancer (Gross, Gallo, & Eaton, 2010).

Physical –mental comorbidity is very common in the general population and leads to a greater absenteeism from work than pure disorders that also cause personal and social problems, causing a mainly additive increase in work-loss (Buist-Bouwman et al., 2005).

#### 2.2.5 Depression and other mental disorders among migrants

Migration is a stressful life event that requires extensive adjustment, may be associated with adverse life events, results in altered health and can contribute to depression (Berry, Kim, Minde, & Mok, 1987). Mental health among migrants has been a subject of intense research, and has been studied extensively in different contexts (Burvill, 1973). As far back as 1932, the Norwegian psychiatrist Ødegård tried to prove in his classic study that depression observed among migrants was due to the selective migration of people who were genetically predisposed to developing the disorder: the selective migration hypothesis (Ødegård, 1932). However, Ødegård's hypothesis has since been revisited, opposed and dismissed by other studies, which conclude that selective migration cannot account for the observation of mental health disorders among migrants (Selten, Cantor-Graae, Slaets, & Kahn, 2002; van der Ven et al., 2015).

A considerable amount of literature has been published on depression among migrants. Depression has been reported among Brazilian female migrants in Australia (da Silva & Dawson, 2004). Depression is also described among Hindu and Asian Indian migrants to the United States who are under pressure to meet up to expectation, while retaining cultural values which uphold male domination and female subjugation (Conrad & Pacquaio, 2005).

High rates of common mental disorders among foreign students in America in the early sixties led to the formulation of the 'foreign student syndrome' with its attendant non-specific somatic complaints, a passive withdrawn interaction style and an unkempt

appearance (Allen & Cole, 1987; Ward, 1962). Similarly, depressive results were also observed among international, non-British students studying in the United Kingdom (Bhugra & Ayonrinde, 2003).

Other studies have demonstrated high rates of depression among various migrant groups such as migrant university students, elderly migrants, migrant workers, and refugees (Ibrahim, Kelly, Adams, & Glazebrook, 2013) ; hence, depression has been cited as an evidence for poor health among migrants due to the high rate of depressive symptoms observed in migrant populations (Lassetter & Callister, 2009). In addition, the World Psychiatric Association recommends that special attention needs to be paid to migrant women, children, adolescents, elderly refugees and asylum seekers for assessment of mental illness (Bhugra, Gupta et al, 2011).

While the above studies seem to paint a grim picture for migrants, other studies have found no increased risk for depression due to migration (Livingston et al., 2001) while another study found that migration might actually lead to improvement in mental health, especially for women, due to improved facilities of health care (Stillman, McKenzie, & Gibson, 2009).

However, migration does not necessarily have to result in depression. The occurrence or non-occurrence of depression among migrants depends on a complex interplay of vulnerability factors such as poor biological and psychological factors from adverse pre-migration experiences in their home countries and protective factors such as personal resilience, social support, voluntary migration and higher socioeconomic class which the migrants inherently possess (Bhugra & Gupta, 2011; Bhugra & Ayorinde, 2003).

Cultural, religious and traditional belief systems play an important role in the expression or acknowledgement of migrants' mental health and subsequent utilization of mental health services. In certain cultures, mental health disorders including depression are generally stigmatized, outrightly denied, and simply unreported, hence the reluctance of affected persons to utilize mental health services (Penn & Martin, 1998; Wahl & Harman, 1989; Zhang, Snowden, & Sue, 1998).

In Asian Indian cultures, talking about mental illness is considered unethical, and admitting the need for mental illness is considered humiliating. Hence, Asian Indian migrants in the United States with a mental illness waited for a crisis to seek care, or returned to India for treatment (the unhealthy remigration effect) (Conrad & Pacquiao, 2005). Sometimes, the stigma associated with mental illness is severe enough to hinder chances of getting married; hence, Asian Indian migrants hid mental illnesses of family members (Conrad & Pacquiao, 2005; Ng, 1997; Sue & Morishima, 1982).

In Buddhist belief, mental illness may be attributed to punishment for some transgressions or influence of metaphysical forces (Kleinman, 1977; Kramer, Kwong, Lee, & Chung, 2002). Similarly, in Somali cultures, mental illness can be attributable to spirits (jinn or saar) who may have possessed the affected person. The recommended treatment involves some form of folk medicine or healing ritual. When it is not possible for Somali migrants living in Finland to get the required (culturally trusted) treatment, the affected person may go back to Somalia for treatment (Tiilikainen, 2003). Indeed, it is known that Somali migrants living in Sweden hardly seek for treatment for mental health illnesses as these illnesses are often denied or stigmatized (Wedel, 2012).

Poor mental health has also been demonstrated among migrants of Russian and Kurdish origin. Russian immigrants who have immigrated to Israel from the former Soviet Union showed poorer mental health compared to the Israeli counterparts who did not migrate (Mirsky, 2009). In addition, depression and high levels of other psychological distress was risk factors for suicidal ideation among Russian immigrants to Israel (Ponizovsky & Ritsner, 1999). Unmet need for treatment for depressive symptoms is prevalent among Russian migrants to the US (Landa, Skritskaya, Nicasio, Humensky, & Lewis-Fernandez, 2015).

In a study conducted among Kurdish migrants, refugees and asylum seekers living in the US, researchers reported severe depression at a prevalence four times higher than the general US population. Female respondents consistently showed higher depression scores compared to the males (Worley, & Natalie, 2007). Another study among Kurdish male migrants to Sweden showed that risk factors for mental health in this group included worry about political situation in home country and dissatisfaction with the Swedish society (Taloyan, Al-Windi, Johansson, & Saleh-Statinn, 2011).

Thus far, this section has discussed extensively about mental health and its impact on migrants. The next section reviews important literature about oral health and its patterns in migrant populations.

## **2.3. Oral Health**

### **2.3.1. Definitions and concepts in oral health**

Before proceeding to examine oral health, it is important to explain some important concepts in oral health. Oral health is defined as, “A state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal (gum) disease, tooth decay and tooth loss, and other diseases and disorders that affect the oral cavity” (National Institute of Dental and Craniofacial Research, 2014). This definition shall be used as a working definition in this thesis. Oral health means much more than just healthy teeth. It involves the gums and their supporting tissues, the palate, the lining of the mouth and throat, the tongue, the lips, the salivary glands, the chewing muscles, the nerves, and the bones of the upper and lower jaws (Benjamin, 2010).

Oral Health Related Quality of Life (ORHQOL) is “a multidimensional construct that reflects (among other things) people's comfort when eating, sleeping, and engaging in social interaction; their self-esteem; and their satisfaction with respect to their oral health. It is an individual concept and is associated with psychological factors, social factors and experience of pain or discomfort (Bennadi & Reddy, 2013). It assesses the perceived impact of oral conditions on wellbeing. It may be measured with the Oral Health Impact Profile (Slade, 1997).

Dental caries, commonly known as tooth decay is a dynamic transmissible bacteria disease process caused by acids from bacterial metabolism diffusing into hard tooth structure (enamel and dentine), resulting in holes or dental cavities (Featherstone, 2008; Selwitz, Ismail, & Pitts, 2007) while periodontal disease is a group of common, chronic



immuno-inflammatory disorders affecting the tooth-supporting structures (Armitage, 1999).

Dental anxiety is the pathologically severe fear of dental treatment to the point where people are able to consult a dentist only if they are experiencing severe pain. This term is often used interchangeably with dental fear, or dental phobia. It is generally the fear of dental care or dental treatment (Mehrstedt & Ansanger, 2007). It can be measured by the Dental Anxiety Scale (Humphris, Dyer, & Robinson, 2009), Dental Fear Survey (Kleinknecht, Klepac, & Alexander, 1973) or the Short Dental Fear Question (Jaakkola et al., 2009). Fear of dental treatment commonly accompanies certain types of mental disorder (Lenk et al., 2013).

### 2.3.2. Burden of oral health disease

Oral health diseases are generally widespread and affect all populations throughout life. Dental caries (tooth decay) and periodontal disease (disease of the gums and supporting structures of the tooth) are considered the most important global oral burdens of disease. Both dental caries and periodontal disease make up the most important oral diseases of public health significance. They are responsible for majority of tooth loss, poor oral related health quality of life and poor quality of oral health. In extreme cases, oral diseases may lead to mortality (Petersen, 2008; Batchelor, 2014).

Other important oral health problems of public health significance include oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS)-related oral disease, hereditary lesions and oral/ dental trauma from injuries (Benjamin, 2010; Petersen, Bourgeois, Ogawa, Estupinan-Day, & Ndiaye, 2005).

Despite the fact that oral disease is a worldwide public health challenge which most people suffer from during their lifetime, the mouth and its diseases are frequently neglected in general health (Kisely, 2016; Petersen et al., 2005). The prevalence of tooth decay among adults is high as the disease affects nearly 100% of persons in the majority of countries while about 60-90% of children in industrialized countries are affected

(Petersen et al., 2005). It is the most common chronic disease in children: about five times as common as asthma and seven times as common as hay fever (Benjamin, 2010).

Periodontitis, which causes weakness of the gum and supporting structures of the tooth, is an important disease of public health concern. Like dental caries, it leads to pain, speech impediments, reduced oral health related quality of life, and eventual tooth loss. Furthermore, it leads to masticatory inefficiency and poor nutritional status. It is the leading chronic inflammatory disease found among humans, and affects roughly half of adults in the United Kingdom. Its effect is especially marked among the elderly; it affects 60% of persons over 65 years. Finally, it contributes a significant proportion of financial burden to the health care economy (Batchelor, 2014; Benjamin, 2010).

Even though oral diseases occur commonly, they are avoidable. Certain factors may predispose an individual to having oral health diseases. These are discussed in the next section.

### 2.3.3. Risk factors for oral health diseases

Dental problems are largely preventable. However, many persons experience poor oral health (Griffin, Jones, Brunson, Griffin, & Bailey, 2011). Risk factors for oral health problems include unhealthy diet, tobacco use and harmful alcohol use. Poor oral hygiene and social determinants are also risk factors for oral disease (WHO, 2017b).

Social determinants of health come into play in oral health risk behavior. Personal and social factors particularly low income, low education, and general high-risk lifestyle behavior have profound effects on risk of oral disease (Pitts et al., 2011; Selwitz et al., 2007). Higher education and occupational status are known to be associated with increased utilization of dental services (Olusile, Adeniyi, & Orebanjo, 2014).

On the other hand, disadvantaged and poor population groups in both developed and developing countries have particularly high burden of oral disease and are at an increased risk of oral disease (Petersen et al., 2005). More so, the elderly have a higher burden of oral disease globally, with subsequent worsening of their quality of life (Petersen, 2008; Pitts et al., 2011). Gender may also have a role to play in oral health care behavior and

utilization. Studies suggest that females tend to practice good oral health care behavior and utilize health care facilities better compared to males (Lukes & Miller, 2002; Mastaki, 2014).

Dental cavities can be prevented by constantly maintaining a low level of fluoride in the oral cavity. This can be achieved by drinking fluoridated water and brushing the teeth regularly with a fluoride containing toothpaste. Additional sources of fluoride include fluoridated salt, milk, mouth rinses, and professionally applied fluoride (Griffin et al., 2011; WHO, 2017b). Regular tooth brushing and tooth flossing are known to be significant predictors for caries and periodontitis (Abdellatif & Burt, 1987; Bjertness, 1991). Other important factors include access to preventive and restorative oral care services (Pitts et al., 2011; Selwitz et al., 2007).

In other places, other nonconventional methods of tooth cleaning have been reported; coconut leaf toothpicks, pins and threads in India (Muttappillymyalil et al., 2009), and chewing stick (miswak) among Muslim populations in Cameroun, Saudi Arabia and Somalia (Laird, Barnes, Hunter-Adams, Cochran, & Geltman, 2015).

#### 2.3.4. Consequences of poor oral health

Poor oral health has a profound effect on general health and quality of life (Petersen et al., 2005). The mouth is indispensable to essential daily activities of daily living such as eating, speaking, chewing, such that it can be regarded as a basic human right (Jin et al., 2016). Oral diseases limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing. Oral health problems may lead to complications such as pain, dysfunction, poor appearance and subsequent loss of self-esteem, absence from school or work and difficulty concentrating on daily tasks (Benjamin, 2010). The result of oral disease is often tooth loss. Rather than an inevitable consequence of aging, tooth loss results from oral disease such as dental cavities or periodontal disease, or injury. Tooth loss most often results from dental caries in children and in adults from untreated periodontal disease (Benjamin, 2010; Jackson, Vann, Kotch, Pahel, & Lee, 2010).

Oral diseases may have significant impact on finances of the economy and the affected individuals. It is the fourth most expensive disease to treat in industrialized countries

(Petersen et al., 2005). In children particularly, poor oral health or dental problems lead to absence from school and poorer school performance (Benjamin, 2010; Jackson et al., 2010).

The mouth is important not only for its obvious masticatory functions, but also because it reflects the general state of health of the body, hence is referred to as the gateway to or a mirror to the body (Baum et al., 1998; National Institute of Dental and Craniofacial Research, 2014; Pearson, 1971). Oral health is integral to general health and poor oral health has been linked with chronic systemic disorders, as risk factors for oral diseases are also same risk factors for the four leading non-oral chronic diseases-cardiovascular diseases, cancer, chronic respiratory diseases and diabetes (WHO, 2017b).

Some systemic diseases which have oral manifestations include HIV, uncontrolled diabetes, or some form of immunosuppression as found in cancers (Reissmann, John, Schierz, Kriston, & Hinz, 2013). Chronic oral infections has also been linked to diabetes, heart and lung disease, stroke, and low birthweight or premature births (Benjamin, 2010; Li, Kolltveit, Tronstad, & Olsen, 2000). In addition, poor oral health is a known risk factor for infective endocarditis-related bacteremia (Lockhart et al., 2009).

#### 2.3.5. Oral health patterns in migrant populations

The section below describes oral health patterns peculiar to migrant populations. Immigrants and minority ethnic groups have been described as "whole populations at risk" on the verge of oral health deterioration. This is because migrants often originate from populations with disease patterns, health behaviors and health systems different from those at their destination. In the host/ destination country, immigrants commonly encounter drastic social, cultural, and psychological life changes which can result in depression, unfavorable health behavior and personal crisis (Zini, Vered, & Sgan-Cohen, 2009).

Migrants and ethnic minorities vary in understanding of oral health and its relation to general health (Corrigan, Newton, Gibbons, & Locker, 2001); hence, oral health behaviors and patterns depend on the type of migrants they are- for example, refugees or

skilled workers. High levels of oral health status perception may be observed in certain groups as is observed among Ethiopian migrants in Israel (Zini et al., 2009).

Acculturation and length of stay in the host country may influence oral health behavior and use of oral health services. It may be associated with better oral health and increased immigrant oral health utilization (Manandhar, 2014). For example, a study conducted in Canada reported that students living in Canada for more than 6 years had a healthier oral health than those who had recently arrived (Locker et al., 1998). However, it may be detrimental to oral health by adoption of negative behavioral habits of the host communities such as poor diet, social stress, low socioeconomic status typical of immigrants and barriers to oral health care service (Cruz et al., 2004).

In contrast to mental health, there is much less information about oral health of migrant populations in European countries. However, studies among migrant children (including preschool children aged 1-4 years) of Iraqi, Lebanese and Pakistani origin living in Australia report poor oral health outcomes compared with their host country counterparts as well as very low utilization of dental services (Christian et al., 2015; Riggs et al., 2014). Other studies show that oral health status among the immigrant population is mostly considered poorer than that of the native populations (Manandhar, 2014).

It has previously been observed that refugees exhibit poorer oral health than voluntary migrants and even disadvantaged groups in the indigenous population; Australian refugees showed particularly high rates of tooth decay compared to indigenous Australian and special needs population who are known to have worse oral health than the general population (Davidson, 2006). In addition, a small pilot study (n=38) conducted among asylum seekers and immigrants in Finland showed that the asylum seekers reported significantly more frequent dental pain and suffered from dental fear more often than the immigrants did. They also reported difficulty in getting an appointment to see a health care professional (Mattila et al., 2016).

Existing research indicates that utilization of oral health care by migrants is usually need driven. In the absence of pain or discomfort, majority of migrants do not utilize oral health services. Most migrants report to the oral health care usually as emergencies; a

characteristic pattern also shared by subjects from lower socio-economic class (Mastaki., 2014; Stronks, Ravelli, & Reijneveld, 2001).

Several studies have shown that immigrants mainly underutilize oral health care services (Denise & et al, 2012; Mastaki, 2014). A study among migrant populations living in Germany reported a similar pattern of low patronage of oral health services compared to non-migrants (Erdsiek, Waury, & Brzoska, 2017). To improve utilization, it has been suggested that health services should consider organizational cultural competence, outreach and increased engagement with the migrant community (Christian et al., 2015).

Poor oral health and low utilization of oral health service observed among migrants may be due to potential barriers which these migrants face at the patient, provider, and system level. Barriers at the patient level are related to patient characteristics; demographic variables, social structure variables, health beliefs and attitudes, personal enabling resources, community enabling resources, perceived illness and personal health practices. The barriers at provider level are related to the provider characteristics: skills and attitudes of the health care provider while the barriers at system level are related to the system characteristics: the organization of the health care system (Scheppers, van Dongen, Dekker, Geertzen, & Dekker, 2006). Other barriers to effective oral health care often faced by immigrants include low income, lack of dental insurance, older age, male sex and acculturation (Mastaki, 2014).

Evidence suggests that refugees and asylum seekers particularly face more challenges with getting access to oral health care compared to voluntary immigrants. Barriers encountered by refugees include long waiting times (13-58 months), variation in assessment criteria, different eligibility criteria and limited interpreter services (Davidson, Skull, Calache, Murray, & Chalmers, 2006; Davidson, Skull, Calache, Chesters, & Chalmers, 2007). In Australia, there is limited priority to general dental services for refugees, with long waiting times for a dental appointment and few interpreter services (Davidson 2007). Similarly, asylum seekers in Finland reported difficulty in getting an appointment to see a dental health care professional (Mattila, 2016).

There is little published data on oral health status among Russian, Somali and Kurdish migrants. However, preliminary results from the Maamu study report that Somalis have

the best oral health status of the three studied groups while Kurdish group has the poorest oral health status (Castaneda et al, 2012). Russian migrants are known to have high rates of oral care utilization. One comparison study of Chinese and Russian elderly immigrants in the US showed that Russian speaking elderly migrants showed much higher rates of oral care utilization than their Chinese counterparts even though both groups faced common barriers such as language barriers and acculturation adjustment. This has been attributed to high education status found among Russians. In addition, dental care is part of national health insurance in the Soviet Union. This might explain the readiness of this group to seek dental care when needed (Wu, Tran & Khatutsky, 2005).

Thus far, this thesis has independently reviewed three key topics: migration, mental health and oral health. It has also discussed cogent issues about mental health and oral health among migrants. The next section explains how mental health is associated with oral health, especially among migrants.

## **2.4 Associations between mental health and oral health**

### **2.4.1. Suggested mechanisms of the relationship between mental health and oral health**

Previous research has established that persons who suffer from mental disorders generally have poor general health (WHO, 2017a). Poor mental health including depression has been associated with several chronic systemic illnesses such as diabetes, cardiovascular disease, chronic respiratory disorders, and cancer (Chu, Yang, Chou, Chiu, & Chi, 2010; Kebede, Kemal, & Abera, 2012; Kisely, Baghaie, Lalloo, Siskind, & Johnson, 2015; Luo et al., 2015; Wey, Loh, Doss, Abu Bakar, & Kisely, 2016). However, less attention has been paid to the aspect of oral health (Kisely, 2016; Wey, 2016).

A considerable amount of literature show that depressive symptoms may be associated with poor oral health. Depression has been associated with high rates of dental caries (Coles et al., 2011; Heidari, Andiappan, Banerjee, & Newton, 2017; Kisely, Baghaie, Lalloo, & Johnson, 2015; Marques-Vidal & Milagre, 2006; Park et al., 2014; Wey et al., 2016), periodontal diseases (Alkan, Cakmak, Yilmaz, Cebi, & Gurgan, 2015; Ehrental, Graetz, Plaumann, Dorfer, & Herzog, 2016; Kisely et al., 2015; Luca, Luca, Grasso, &

Calandra, 2014; Marques-Vidal & Milagre, 2006; Park et al., 2014; Sundararajan, Muthukumar, & Rao, 2015) and tooth loss (Delgado-Angulo et al., 2015; Luo et al., 2015; Okoro, Strine, Eke, Dhingra, & Balluz, 2012; O'Neil et al., 2014; Park et al., 2014; Silveira, Whitcomb, Pekow, Carbone, & Chasan-Taber, 2016).

Several theories have been proposed about the theoretical mechanism of relationships between poor mental health and poor oral health. It could proceed in two ways; poor mental health could lead to poor oral health, on the other hand, poor oral health could lead to poor mental health. However, most studies about this subject are cross sectional studies and a causal relationship cannot be established. The following are the proposed mechanisms of how poor mental health and poor oral health are associated.

*How poor mental health can lead to poor oral health*

1. Severe mental illness and eating disorders are associated with dental disease such as erosion, caries and periodontitis due to general neglect of hygiene and body care in these persons (Coles et al., 2011; Kisely, 2016).
2. Persons with poor mental health or depressive symptoms may exhibit unhealthy dietary preference for sugary diet or foods with a high glycemic index which are a known risk for oral diseases. A cross sectional study in Finland lends evidence to this concept by showing high prevalence of lactobacilli bacteria among subjects with depressive symptoms (Anttila, Knuuttila, & Sakki, 1999). Lactobacilli are gram-positive bacteria, whose causative role and association with dental caries is well established, both in adults and in children (Badet & Thebaud, 2008; Caufield, Schon, Saraithong, Li, & Argimon, 2015).
3. Disturbances in the hypothalamic-pituitary axis system and hypothalamic-pituitary-thyroid system (due to poor mental health) can affect the periodontal status by compromising the immune system (Anttila et al., 1999; Sundararajan et al., 2015).
4. One of the side effects of anti-depressive medications is reduction of salivary secretion, causing a condition known as dry mouth or xerostomia. This, in turn exacerbates poor oral health (Anttila et al., 1999; Okoro et al., 2012).



5. Mental health disorders which manifest as eating disorders such as anorexia nervosa, and bulimia nervosa can give rise to poor oral health by causing acid erosion on teeth, dry mouth (xerostomia), salivary gland pathology and tooth decay (Kisely et al., 2015).

*How poor oral health leads to poor mental health*

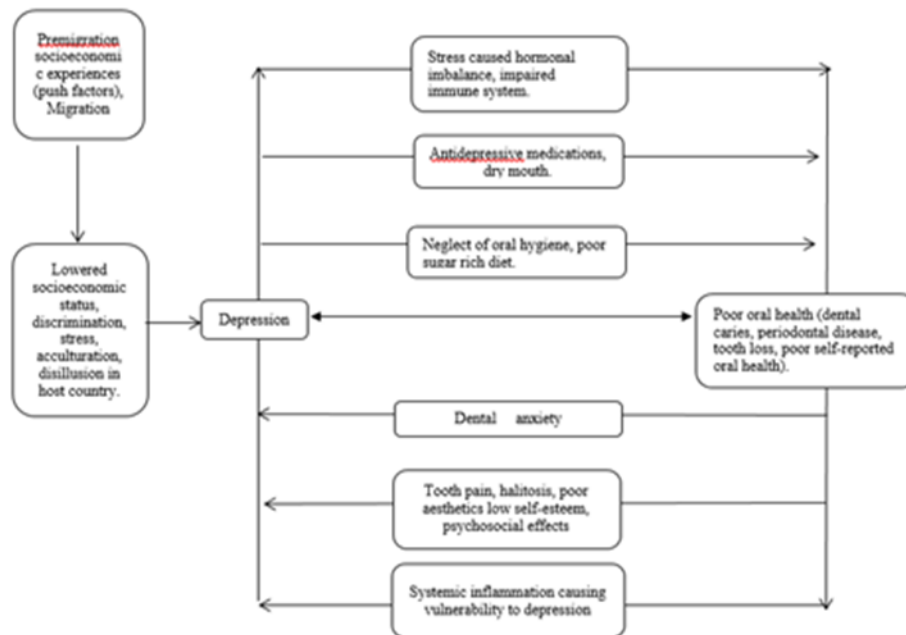
1. Fear of dental treatment could lead to anxiety in form of dental fear or phobia (Heidari et al., 2017; Kisely, 2016). It is known that dental fear is commonly associated with mental disorders and may be an under recognized symptom in people with impaired mental health (Lenk et al., 2013).

2. Poor oral health may result in impairments in eating, speech, and other social and psychological areas of life (Kisely, 2016). Manifestations of poor oral health such as halitosis (bad breath), poor aesthetics due to discolored, missing teeth or crooked teeth can give rise to depression through low self-esteem, self-consciousness and psychosocial effects such as shame, embarrassment and loneliness (Dumitrescu, 2016; Slade, 1997).

3. Periodontal disease is associated with high levels of systemic inflammation. Depression is also linked to chronic low-grade systemic inflammation. The additive effect of these inflammatory effects may worsen already poor depressive symptoms (Dumitrescu, 2016).

Figure 1 below illustrates a summary of hypothetical pathways through which depression and poor oral health may be related in migrant populations.

Figure 1. Hypothetical model showing pathways of relationship between depression and poor oral health in migrant populations.



#### 2.4.2. Association between severe mental illness and poor oral health

A considerable amount of literature has documented poor oral health among people with severe mental illness. A systematic review and meta-analysis for the past 25 years examined the association between severe mental illness and poor oral health among 5076 psychiatric patients and 39,545 controls. The controls were people without severe mental illnesses and were pooled from the same either study or community surveys. 25 different articles were included in the meta analyses: 13 were from European countries while others were from India, Taiwan, Australia, Israel, Hong Kong, Ethiopia and the US. The inclusion criteria for severe mental illness in the study were dementia, schizophrenia, bipolar affective disorders and other affective disorders. The results of the study showed that people with severe mental illnesses had increased odds of having lost all their teeth compared to the general community (OR =2.8, 95% CI: 1.7-4.6), and significantly higher burden of tooth decay (Kisely et al., 2015). A brief summary of relevant studies on poor mental health and poor oral health are presented below in Table 1.

In another cross sectional study among 543 long stay in-patients with chronic schizophrenia in Malaysia, researchers showed that the burden of tooth decay among the inpatients was about double that of the general population, and only a minimal segment of the subjects had healthy gums (Wey et al., 2016). Similarly, in a cross-sectional study in Taiwan, high rates of dental caries were reported among institutionalized schizophrenia patients (Chu et al, 2010).

Elsewhere, a case control study among psychiatric outpatients with major depression in Catania, Italy, which involved 50 cases and 40 controls, showed that significantly worse periodontal status was observed in the psychiatric outpatients with major depressive symptoms compared to the controls who did not have depressive symptoms (Luca et al., 2014). In Ethiopia, poor oral health status has also been recorded among psychiatric patients (Kebede et al., 2012). In another study in India, poorer periodontal health was observed among chronic psychiatric patients, compared to the control group (healthy non-psychiatric patients). Hence, there has been a call for better oral health care among chronic psychiatric patients (Nayak, Singh, & Kota, 2016).

#### 2.4.3 Association between depressive symptoms and poor oral health

Depression has also been linked to poor oral health as seen in its manifestations of tooth decay, periodontal disease and missing teeth among ambulant seemingly healthy subjects who have depressive symptoms.

A number of cross sectional studies suggest an association between depression and poor oral health. In the US, National Health and Nutrition Examination Survey (NHANES) cross sectional studies showed a positive dose response relationship between number of dental problems and depression (O'Neil et al, 2014). Likewise, a cross sectional survey of 388 Portuguese health science students showed that anxiety was significantly related to perceived toothache (OR=2.90, 95% CI: 1.24-6.72) while depression was related to gum bleeding (OR= 4.96, 95% CI: 1.68-14.59) (Marquo-Vidal Milagre, 2006).

Another cross sectional nationwide sample of 6139 Korean adults reported that depression was significantly related to toothache (OR=1.18, 95% CI: 1.01-1.39) (Park et al., 2014). Similarly, a cross-sectional study conducted among Finnish adults (n=8028)

reported that depression was significantly associated with decayed teeth; depressed persons were 1.25 times more at risk of having decayed teeth compared to those who were not depressed (Delgado-Angulo et al., 2015).

As the result of untreated oral disease is often tooth loss, it is no surprise that depression has been linked to tooth loss as well. Studies from the 2008 Behavioral Risk Factor Surveillance System among adults aged >18 years in the US showed that tooth loss was associated with depression (Okoro et al., 2012). Similar results were obtained among pregnant women in the US in the 2010 Behavioral Risk Factor Surveillance System (Silveira et al, 2016).

Furthermore, longitudinal studies of dental outpatients with periodontal disease showed that tooth loss is a potential risk factor for the development of depression as fewer teeth predict higher severity of depressive symptoms (Ehrenthal et al, 2016). Elsewhere, a case control study among dental patients suffering from periodontal disease involving 35 cases and 35 controls with no periodontal disease showed that periodontal patients had a significantly higher total depression score than normal controls (Sundararajan et al, 2015).

Some studies produced mixed results; a cross-sectional study among adult males and females found no correlation between depression and decayed teeth, but found that subjects with higher depression and anxiety scores had more missing teeth and worse periodontal health (Alkan A., et al, 2015). Similarly, a cross sectional study among 55 year old population (n=780) in Finland found no association between depressive symptoms and dental caries, periodontal status, or number of teeth but found depression to be associated with edentulousness (toothlessness) among nonsmoker men (Anttila, Knuuttila, & Sakki, 2001). However, another cross sectional study found that subjects with mental health problems in Florida, US did not differ significantly in their self-perceived dental needs compared to those who did not have mental health problems (Boothroyd & Ware, 2015).

Dental fear or phobia (fear of dental treatment) may have a role to play in the association between depressive symptoms and poor oral health. As indicated previously, dental phobia may accompany some forms of mental disorder (Lenk et al., 2013). Results from

the Adult Dental Health Survey conducted in the United Kingdom showed that compared to the non-phobic population, persons with dental phobia were more likely to have dental caries present and poorer oral health related quality of life (Heidari et al., 2017). Similarly, subjects in Finland with both depressive and anxiety disorders were more likely to have high dental fear than those without these disorders (Pohjola, Mattila, Joukamaa, & Lahti, 2011).

Table 1. Summary of important studies showing association between depression and poor oral health among populations with varying degrees of mental illness, including depression and severe mental illnesses.

<b>Authors</b>	<b>Study design and study population, number of participants (n) , year when study was conducted</b>	<b>Main results</b>
Kisely et al, 2015	Systematic review and meta-analysis of 25 years of oral health of people with severe mental illness (n=5076), controls (39,545), year 2014	People with severe mental illnesses had 2.8 odds of having tooth loss and significantly higher rates of decayed, missing and filled teeth (DMFT), compared to those who did not have
Marquo-Vidal Milagre, 2006	Cross sectional survey of Portuguese health science students (n= 388), year 1999	Anxiety was significantly related to perceived toothache OR=2.90, 95% CI : 1.24-6.72; depression was related to gum bleeding OR= 4.96, 95% CI : 1.68-14.59
Park et al, 2014	Cross sectional nationwide sample of Korean adults in South Korea(n=6139), year 2010	Depression is significantly related to toothache, OR=1.18, 95% CI: 1.01-1.39.
Delgado-Angulo et al., 2015	Cross-sectional study of Finnish adults from Health 2000 Survey, n= 8028.	Depression was associated with decayed teeth Relative Risk 1.25, 95% CI 1.07-1.45

Luo et al., 2015	Cross sectional study of Chinese older adults aged 60 and above from the Shanghai Aging Study, China non institutionalized n=3063, year 2012	Tooth loss of more than 16 teeth was significantly associated with dementia OR 1.56 (95% C.I.1.2-2.18)
Okoro et al, 2012	Cross-sectional study of adults aged >18 years in US from the 2008 Behavioral Risk Factor Surveillance System. n=80,486, year 2008	Adults with depression had increased odds of tooth loss compared with those who were not depressed  Loss of 1-5 teeth: AOR 1.35 (95%C.I. 1.14-1.59)  Loss of 6-31 teeth : AOR 1.83(95% C.I. 1.51-2.22)  Loss of all teeth: AOR 1.44 (95% C.I. 1.11-1.86)
Silveira et al, 2016	Cross sectional study of pregnant women in US from the 2010 Behavioral Risk Factor Surveillance Survey, n=402, year 2010	Diagnosed current depression increased the odds of tooth loss by OR 1.18(95 C.I. 0.44-3.16)
Antiila et al., 2001	Cross sectional study among 55 year old population in Oulu, Finland, n=780	Depressive symptoms were not associated with dental caries, periodontal disease, or number of teeth. However, among non – smoker men, depression was associated with edentulousness(toothlessness) among nonsmoker men OR 6.4 (95% C.I. 1.4-29.2)
O'Neil et al, 2014	Cross sectional study of two National Health and Nutrition Examination Survey (NHANES) among civilians	Positive dose response relationship between number of dental problems and depression. Compared with individuals without an oral health condition, adjusted

	aged 20-75 years in US in year 2005-2008. n=10,214	OR (95% C.I) for depression among those with oral health conditions were:  2 conditions: OR 1.60(1.08-2.38) 4 conditions: OR 2.13(1.46-3.11) 6 conditions: OR 3.94 (2.72-5.72)
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In this study, we aim to describe the overall oral and mental health parameters of migrants of Russian, Somali and Kurdish origin living in Finland. In addition, we investigate association between mental health and self-perceived oral health among migrants of Russian, Somali and Kurdish origin who are living in Finland.

#### 2.4.4. Relevant modifiers of the mental health-oral health association

A review of the literature revealed few factors which might modify or influence the association between mental and oral health. A brief discussion of these possible modifiers are discussed below.

##### *Age*

Older age may accentuate the association between mental health symptoms and poor oral health. Chu et al., (2010) suggested that aging was the most significant factor related to high rate of dental caries among institutionalized schizophrenia in a similar study in Taiwan. Similarly, poor oral health evidenced by high burden of decayed teeth and periodontal disease increased with age among institutionalized psychiatric patients in Italy (Angelillo et al., 1995). In Malaysia, in a study conducted among long stay in-patients with schizophrenia, higher rates of tooth decay was associated with older age (Wey, 2016).

The mental health-oral health association may be observed only in a particular age group; a cross sectional study conducted among Finnish adults reported that depression was associated with decayed teeth only among 35-54 year old age group and not among other age groups (Delgado-Angulo et al., 2015).

##### *Severity of mental illness*

Evidence suggests that poorer oral health is proportional to the severity of mental illness. In Malaysia, in a study conducted among long stay in patients with schizophrenia, higher number of decayed teeth was associated with longer illness duration (Wey, 2016) while another study indicated that the number of subjects with worse periodontal disease increased with increasing length of institutionalization (Angelillo et al., 1995).

Another study reports that subjects with higher depression and anxiety scores are known to have more missing teeth and worse periodontal health (Alkan et al., 2015) while a study among dental patients with periodontitis showed that the periodontal patients had a significantly higher depression score than the controls who did not have periodontitis (Sundararajan et al., 2015).

#### *Disadvantaged populations*

Disadvantaged populations may be at increased risk of depression and poor oral health; depression was related to dental health status and oral-health-related factors in studies among Scottish homeless people (Coles et al., 2011). Similarly, in a cohort study conducted among Aboriginal Australian young adults, being female, having experience of dental disease in one or more teeth, being dissatisfied about dental appearance and racial discrimination were associated with poor mental health (Jamieson, Paradies, Gunthorpe, Cairney, & Sayers, 2011). Among migrant populations, asylum seekers are especially at risk: asylum seekers in Finland displayed poorer awareness of good oral health care habits compared to the voluntary migrants (Mattila et al, 2016).

#### 2.4.5. Association between depressive symptoms and poor oral health among migrant populations

To the best of my knowledge, no previous study has investigated associations between depression and poor oral health among migrant populations. Hence, this study aims to fill in the gap of knowledge by exploring these associations among migrants of Russian, Somali and Kurdish origin living in Finland. The results of the study will provide more information about this unique aspect of migrants' health needs, enabling improved health care for migrants.



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#### **4. ARTICLE MANUSCRIPT**

### **The association between depression and poor oral health among migrants of Russian, Somali and Kurdish origin living in Finland; a population-based study**

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## **Abstract**

**Background:** Scientific literature shows a bi-directional association between depression and poor oral health. However, studies conducted among migrants are not available. This study examines the association between depression and self-reported oral health among Russian, Somali and Kurdish migrant populations in Finland.

**Methods:** Data from the Finnish Migrant Health and Wellbeing Study were utilized. The participants in the study were persons of Russian, Somali and Kurdish origin aged 18-64 years living in Finland. Depressive symptoms were assessed using the Hopkins Symptom Checklist (HSCL-25). Oral health measures included self-estimated oral health status, need for oral health care and dental /denture problems in the last 12 months. Results were calculated separately for men and women using logistic regression.

**Results:** After adjusting for relevant socio-demographic and health factors, depressive symptoms were positively associated with poorly self-estimated oral health among Russian men odds ratio OR 8.10(95% CI 2.05-32.05), Kurdish men OR 1.69 (95% CI 1.09-2.85), and Kurdish women OR 2.07 (95% CI 1.20-3.57). Depressive symptoms were positively associated with need for dental care among Russian men only OR 7.32 (95% CI 1.68-32.14), Kurdish men OR 1.72 (95% CI 1.00-2.98) and Kurdish women OR 2.19 (95% CI 1.26-3.83).

Depressive symptoms were positively associated with having had dental or denture problems in the last 12 months only among the Kurdish women OR 1.73 (95% CI 1.05-2.84). No significant associations were found among the Somalis.

**Conclusions:** The association between depressive symptoms and poor oral health varies among different migrant populations being strongest among the Kurdish population.

**Keywords:** Migrants, self-reported oral health, depression, population.

## **Introduction**

Poor mental health has been linked with several diseases including cardiovascular disease, diabetes and chronic pulmonary disorders, coronary heart disease, arthritis and some forms of cancer (Anderson et al., 2001; Barth et al., 2004; Gump et al., 2005; Kessler & Bromet, 2013). Although little attention is paid to the issue of oral health, it also linked to poor mental health as shown in previous studies (Kisely, 2016). A systematic review and meta –analysis of 25 years showed that people with severe mental illnesses had 2.8 odds of having tooth loss and significantly higher rates of decayed, missing and filled teeth(DMFT) compared to those who did not have (Kisely et al, 2015).

Studies among people with severe mental illness such as schizophrenia, major depressive disorders, dementia, and bipolar affective disorders in Ethiopia, Malaysia, Taiwan and China also show similar associations between severe mental illness and poor oral health (Chu et al., 2010; Kebede et al., 2012; Kisely et al., 2015; Luo et al., 2015; Wey et al., 2016). Important oral diseases of public health significance include dental caries (tooth decay) and periodontal disease (disease of the supporting structures of the tooth) (Batchelor, 2014; Petersen, 2008). The inevitable result of untreated oral disease is tooth loss with its attendant disabilities (Benjamin, 2010; Jackson, Vann, Kotch, Pahel, & Lee, 2010),

These associations have also been demonstrated in seemingly healthy subjects. Two Cross sectional NHANES studies among civilian adults in the US showed a positive dose response relationship between number of dental problems and depression (O’Neil et al, 2014). Depression was significantly associated to decayed teeth among Finnish adults (Delgado-Angulo et al., 2015), toothache among Korean adults (Park et al, 2014) gum bleeding among Portuguese students (Marquo-Vidal Milagre, 2006), and tooth loss among US adults and pregnant women (Okoro et al, 2012; Silveira et al, 2016).

However, some studies find mixed results: A cross sectional study among 55-year-old population in Finland showed that depressive symptoms were not associated with dental caries, periodontal disease, or number of teeth. However, among nonsmoker men, depression was associated with edentulousness (toothlessness) among nonsmoker men (Antilla et al., 2001). A cross-sectional study among adult males and females showed that even though subjects with higher depression and anxiety scores had more missing teeth

and worse periodontal health, no correlation was found between depression and decayed teeth (Alkan A., et al, 2015).

Association between depression and poor oral health may be bidirectional. Poor mental health may lead to poor oral health through neglect of general body care and poor sugar laden diet (Anttila et al., 1999). Persons with poor mental health may abuse tobacco, alcohol or other psychostimulants, which in turn worsen their oral health (Alkan et al., 2015; Dumitrescu, 2016). They may use anti-depressive medications which worsen oral health by causing dryness of the mouth (Kisely, 2016). On the other hand, poor oral health may induce dental fear or phobia (Heidari et al., 2017; Kisely, 2016), or induce feelings of shame and isolation-psychosocial effects, leading to depression (Dumitrescu, 2016).

Migration is an adverse life event which may have untoward effects on mental health. (Berry, Kim, Minde, & Mok, 1987). Multilevel analyses about immigrants and ethnic minorities in 23 European countries show that prevalence rates of depressive symptoms are higher for immigrant and ethnic minority groups than natives in a substantial part of the European countries (Missinne & Bracke, 2012). Most studies show poorer mental health compared to the host country (Bhugra & Ayonrinde, 2003; Lassetter & Callister, 2009).

Similarly, poor oral health has been observed in migrant populations (Manandhar, 2014) as well as disadvantaged and poor populations (Petersen et al., 2005). Migrants face barriers to oral health care such as financial barriers, lack of dental insurance, language barriers and older age. Low utilization of oral health services is noted among migrants; it is characteristic to use dental services only in emergencies (Mastaki, 2014; Denise et al, 2012; Stronks, Ravelli, & Reijneveld, 2001).

Associations between depression and oral health have not been studied in migrant populations. This study examines the association between depression and self-reported oral health, perceived need for oral health care and a history of having had toothache or denture problems in the last 12 months among migrants of Russian, Somali and Kurdish origin living in Finland. This study will contribute more information about this important aspect of migrants' health needs with the aim of improving migrant health.

## **Methods**

### *Materials*

Data was obtained from the cross-sectional Finnish Migrant Health and Wellbeing Study (Maamu). The Maamu study is the first large scale population based health examination survey among migrants of Russian, Somali and Kurdish origin living in Finland. The study was conducted between 2010-2012 by the National Institute for Health and Welfare (THL) (Castaneda, Rask, Koponen, Mölsä, & Koskinen, 2012). The Maamu study comprised of a comprehensive health examination and a detailed interview, both conducted by bilingual field staff. In addition, a short interview was offered to those who refused to participate in the full interview.

### *Study Subjects*

Participants were drawn from six major cities in Finland; Helsinki, Vantaa, Espoo, Tampere, Turku and Vaasa. A sample of 3000 people aged 18-64 years, and who had lived in Finland for at least a year were randomly selected from the National Population Register, comprising 1000 Russians, 1000 Somalis and 1000 Kurdish persons. All sampled persons were invited to participate in the study through posted letters. The sampling method was stratified random sampling by municipality and ethnic group (Castaneda et al., 2012).

Selection criteria for the Russian group was Russia or former Soviet Union as country of birth and Russian or Finnish as native language. The Somali group included persons born in Somalia. The Kurdish group included persons born in Iraq or Iran and speaking Kurdish as their native language. Participation rates were high: 70% of Russians, 51% Of Somalis and 63% of Kurdish origin participated in at least one part of the study. Non-respondents were not replaced with other subjects.

The main criterion for the interviewers and research nurses was that they had a good command of Finnish and the mother tongue of the target group (Russian, Somali and Kurdish); hence, no interpreters were needed. Interviewers and research nurses were trained before the study was conducted.

The Co-ordinating Ethical Committee of the Helsinki and Uusimaa Hospital Region, Finland granted ethical approval for the study. A separate written informed consent was obtained for the health interview and the health examination from each participant.

### *Measures*

*Depressive symptoms* Replies to validated translations of questions in the Hopkins Symptoms Checklist (HSCL-25) (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) were collected in the health examination or by an interviewer (where the participant had difficulty with literacy or problems with reading). The HSCL-25 checklist is a widely known screening self-report symptom inventory that measures symptoms of anxiety and depression and has been proven a sensitive and reliable case finder of depressive disorders (Frojd, Hakansson, & Karlsson, 2004; Kleppang & Hagquist, 2016). It has been used extensively among traumatized refugees of war and torture (Mollica, Wyshak, de Marneffe, Khuon, & Lavelle, 1987), as well as populations unaffected by war (Silove et al., 2007) and has been found to be suitable in cross-cultural Western populations hence is considered suitable for this study which involves different ethnic groups (Tinghog & Carstensen, 2010)

The HSCL-25 consisted of 15 questions for depression and 10 questions for anxiety (as shown in Table 1). The response options for each question were not at all, a little, quite a bit and extremely. Mean scores for depression (HSCL-15) and anxiety (HSCL-10) were calculated separately by dividing the responses by the number of answered items to obtain a mean score ranging from 1.0 to 4.0. Mean score  $\geq 1.75$  was used as the cut off point for prevalent depressive and anxiety symptoms as has been used in previous studies (Mollica et al., 1987; Nettelbladt, Hansson, Stefansson, Borgquist, & Nordstrom, 1993). Participants were included in the analysis if they had responded to at least 11 items of the HSCL-15(depression) and 8 items of the HSCL-10 (anxiety).

*Oral health symptoms* In this study, the main measures used to assess oral health are self-reported oral health, need for dental care and toothache/ denture problems in the last 12 months. In the long and short interviews, participants were asked, ‘What do you think about the state of your teeth and oral health today’? Response categories were: good, pretty good, average, pretty bad and bad. Responses categories good and pretty good were grouped together as good, and average, pretty bad and bad were regrouped as poor. The

participants were also asked: ‘Do you need dental care now?’ and ‘Have you had toothache or any other problems with dental prosthesis in the last 12 months’? Responses for the latter two questions were Yes and No. Self-reported oral health is valid for surveillance population based oral health surveys (Silva et al., 2014; Taylor & Borgnakke, 2007) and has been used among immigrants and asylum seekers (Mattila et al., 2016).

*Background/Control variables* Age was reported in years as a continuous variable. Unemployment status was recategorised from seven categories to two: full time employment and part time employment were grouped together as employed, while student, retired, unemployed or laid off, caring for children at home, and others were grouped as unemployed. Basic education was assessed as having completed high school (or part of it) or not. We used language proficiency in Finnish/ Swedish language as a proxy for integration into the community and ease of communication in everyday activities and life. Long term illness was defined as having ever being diagnosed of any of the following diseases by a physician- cardiovascular disease, (coronary heart disease, high blood pressure and diabetes), asthma, chronic bronchitis, knee osteoarthritis or hip osteoarthritis.

#### *Statistical methods*

Descriptive data on factors which are known or expected to be associated with depression and poor oral health were reported separately for the three ethnic groups (as numbers and percentages or means and standard errors). Using cross tabulation and the chi square analysis, we examined the relationships of socio-demographic and health characteristics with depression and our oral health variables. We examined age, basic education, length of time lived in Finland, employment status, income, spoken language proficiency in Finnish/ Swedish language, refugee status, having children in the household, poor self-estimated general health regular smoking, obesity and long term illness. The following factors were associated with depression, and were a risk factor for poor oral health: age, unemployment status, basic education, spoken language proficiency in Finnish / Swedish language, and having long-term illness in at least one ethnic group, hence we fitted them in the logistic models.

Logistic regression analysis was used to test for association between depression and oral health variables which were; poor self-reported oral health, need for dental care and

toothache/ denture problems in last 12 months. We constructed three models: Model 1 being the unadjusted model, showing the logistic regression between depression and a selected oral health variable. In Model 2, we adjusted for age. Model 3 was the fully adjusted model where we adjusted for age, basic education, employment status and language proficiency, and presence of a long-term illness. The results are presented as odds ratio (OR) with 95% confidence intervals (CI).

We found effect modification between depression, oral health variables (self-estimated oral health, and perceived need for oral care) and gender. Hence, we stratified all analysis and results by gender. Inverse probability weighting, finite population correction and stratification based on register information (age, sex, migrant group, study location and marital status) were used in statistical analysis to address non-response bias and different sampling chance across the groups (Castaneda et al., 2012; Harkanen, Kaikkonen, Virtala, & Koskinen, 2014; Lehtonen & Pahkinen, 2004; Robins, Rotnitzky, & Zhao, 1994). All analysis were performed using STATA/IC 12.0 and SPSS 23 software.

## **Results**

### *Main Findings*

The highest prevalence of depression was found among the Kurdish group, while the lowest was in the Somali group. Across all the groups, women demonstrated higher depressive symptoms compared to the men. Oral health parameters were best among the Somali group. Table 2 shows the prevalence of depressive symptoms and oral health for all the ethnic groups. We found associations between depressive symptoms and poor oral health among the Kurdish group and Russian men while no associations were found among the Somali group. The associations between depressive symptoms and oral health in our study for all three ethnic groups are shown in Table 3.

### *Descriptive factors related to mental health*

The highest prevalence of depressive symptoms was found among the Kurdish group, followed by the Russian group while the lowest prevalence was observed among the Somali group. In all the groups, women showed almost double prevalence of depression compared to men: Russians 23.5% and 12.0%, Somalis: 12.5% and 6.3% and Kurdish: 49.3% and 25.6% respectively. Utilization of mental health services in the last 12 months was also higher among women in all the migrant groups.

However, utilization of mental health services was highest in the Russian group, followed by the Kurdish group, while the Somalis reported lowest utilization of mental health services. The mental health descriptive results are presented in Table 2.

#### *Descriptive results related to oral health*

The Kurdish group presented with the highest prevalence of poor oral health while the Somali group had the lowest prevalence of poor oral health. In addition, the women generally reported poorer oral health and higher perceived need for oral care compared to the men.

Poor self-estimated oral health status was roughly equal among women and men (50.8% and 48.0%, respectively) in the Russian group and in the Kurdish group (48.4% and 47.4% respectively). Among the Somali group, only 36.4% of women and 12.8% of men reported poor oral health.

Dental /denture problems in the last 12 months were equally common among men and women in the Russian group; 45% and 47.4% respectively. However, among Somalis and Kurdish groups, women reported much higher scores compared to the men, Somalis 24.5% and 41.2%: Kurdish 49.1% and 58.4% respectively.

Perceived need for dental care was similar for both men and women in the Russian and Kurdish groups (50.2% and 54.2%: 62.2% and 67.3% respectively). The disparity was more marked in the Somali group as 39.7% of men reported need of dental care compared to 68.9% of women who did. These oral health descriptive results are displayed in Table 2.

#### *Associations between depression and oral health*

Depressive symptoms were positively associated with poor self-estimated oral health among Russian men OR 8.10 (95% CI 2.05-32.05), Kurdish men OR 1.69 (95% CI 1.09-2.85), and Kurdish women OR 2.07 (95% CI 1.20-3.57). Depressive symptoms were positively associated with need for dental care among Russian men OR 7.32 (95% CI 1.68-32.14), Kurdish men OR 1.72 (95% CI 1.00-2.98) and Kurdish women OR 2.19 (95% CI 1.26-3.83). Depressive symptoms were positively associated with having had dental or denture problems in the last 12 months only among the Kurdish women OR 1.73



(95% CI 1.05-2.84). No significant associations were found among the Somalis or Russian women. The associations between depression and oral health are described in detail in Table 3. Model 1 shows the unadjusted model. In Model 2, we adjusted for age. Model 3 is the fully adjusted model where we adjusted for age, education, unemployment, language proficiency and presence of long-term illness. With each adjustment in Model 2 and 3, the association was strengthened only in Russian men. No specific trend was observed in the trend of association in the Kurdish group.

## **Discussion**

### *Main Findings*

We find that depressive symptoms are associated with poor oral health among Russian men, Kurdish men and Kurdish women, but not among the Somali population. We find also that depressive symptoms are most prevalent among the Kurdish ethnic group. Across all ethnic groups in our study, depressive symptoms were more marked among females. Finally, oral health differs significantly across the ethnic groups: the Somali group having remarkably good oral health compared to the other groups while the Kurdish group seem to have the poorest oral health.

### *Depressive symptoms*

It is known that migration is a stressful life event which may contribute to depression (Berry, Kim, Minde, & Mok, 1987). Prevalence of depression and recent utilization of mental health services are highest in the Kurdish group compared to the other two groups. The Kurdish group are from Iraq and Iran. They have mainly migrated to Finland fleeing war and other adverse life conditions, mostly as asylum seekers or refugees. In addition, this group has lived in Finland for the shortest period compared to the other groups. They experience high levels of unemployment (more than half of our sample was unemployed) and low education; known risks for poor depressive symptoms. Our results are consistent with other studies which show that refugees or asylum seekers are at a higher risk for depression (Bhugra, Gupta et al, 2011). Similarly, another study reported that Kurdish migrants living in US (mostly made up of refugees) showed severe depression at a rate four times higher than the general US population (Worley, & Natalie, 2007).

The Russian group has the next highest prevalence of depressive symptoms as well as utilization of mental health services in our study. While studies about mental health of

Russian migrants is scarce, a study among Russian migrants in Israel indicated that Russian immigrants to Israel have poorer mental health compared to those who did not migrate (Mirsky et al, 2009). Similarly, another similar study in the US reported that unmet need for treatment for depressive symptoms was prevalent among Russian migrants to the US (Landa et al., 2015).

In our study, the Somalis report the lowest prevalence of depressive symptoms among both men and women as well as lowest prevalence of utilization of mental health services. However, from previous research among Somali migrants in Sweden, it is known that mental health is often denied or stigmatized in this population, hence, western cures of mental health treatment are hardly utilized (Wedel, 2012) and mental illness is sometimes attributed to spiritual reasons (Kuittinen et al., 2017; Tiilikainen, 2003). Somalis living in Finland have been known to return home for treatment when disillusioned with western medicine, as it does not solve their mental health problems (Tiilikainen, 2003); thus creating a false positive picture of mental health: the so-called unhealthy remigration effect (Lassetter & Callister, 2009; Razum, Zeeb, Akgun, & Yilmaz, 1998). Hence, we opine that the true prevalence of depression among the Somalis is much higher than what it appears to be in this study especially given that Somalis are the highest number of refugees living in Finland and in other western countries. They also have the highest levels of unemployment, low basic education and low socioeconomic status in our study, (as shown in Table 2) which are known to increase the risk of depression in migrants.

From our study, women exhibited about double the prevalence of depressive symptoms compared to the men across the three ethnic groups as shown in Table 2. This is consistent with other previous studies that indicate that women are at a higher risk of depression compared to men (Markkula et al., 2015; van de Velde et al., 2010; Worley, & Natalie, 2007). We also observe that utilization of mental health services in the last 12 months was higher among women in all the migrant groups.

### *Oral health*

Immigrants have been described as entire populations at risk of oral health deterioration. (Zini, Vered, & Sgan-Cohen, 2009). Previous studies indicate that immigrants generally face barriers to oral health care such as long waiting queues, language barriers, low

income and lack of dental insurance (Scheppers et al., 2006; Mastaki, 2014). Details of the oral health results are shown in Table 2.

Prevalence of poor oral health was highest among the Kurdish group in our study. The Kurdish group reported highest prevalence of poor oral health in all our oral health variables; poor self-estimated oral health, perceived need for dental care and dental /denture problems in the last 12 months. Literature about oral health of Kurdish migrants from other countries is scarce but preliminary results from the Maamu study indicate that the Kurdish group have the lowest adherence to the recommended frequency of oral hygiene (Castaneda et al, 2012). As a group, Kurdish migrants face the greatest disadvantage, as they are mainly refugees and asylum seekers. Unemployment rates, low education, low income and general low socio economic status contribute to increased risk for poor oral health in this population.

Roughly half of the Russian group, both male and female reported some form of poor oral health variable. Studies about oral health care of migrant Russians from elsewhere are scarce. However, one study reports that utilization of oral health services among Russian migrants living in the US is high, probably because of high education levels and also because dental care is part of national insurance in the Soviet Union (Wu, Tran & Khatutsky, 2005).

The Somali group report better oral health than the other two groups in our study across all our oral health measures, as well as having the highest mean number of teeth in men and women compared to the other groups. Preliminary results from the Maamu study show that Somalis have the best oral health in the study (Castaneda et al, 2012). Studies among other Somali refugees in the US show that religion and culture plays a large role in oral health hygiene. The use of the stick brush (miswak) is associated with the religious practice of cleansing before prayer in Somalia. When unable to find stick brushes (miswak) in the US, many Somali migrants adopted the Western toothbrush. Considering that prayer is performed five times daily, this makes for a high frequency of tooth brushing (Kebede et al., 2012; Laird et al., 2015). This report is consistent with our own study, which shows that that Somalis have the highest prevalence of frequency of tooth brushing, of the three ethnic groups (shown in Table 2).

We note that women from all the ethnic groups seem to generally report poorer oral health and dental /denture problems in the last 12 months compared to the men. This result differs from a previous study which reported that male sex might be a risk factor for poor oral health (Mastaki, 2014). Higher perception of having need for dental care observed among women may indicate a more enthusiastic attitude towards their oral health care. Furthermore, apart from the women in the Somali group who report slightly lower prevalence than the men, women in the other groups show higher prevalence of frequency of tooth brushing than the men. This is consistent with other studies which report that women show better oral health care behavior compared to the men (Lukes & Miller, 2002; Mastaki, 2014).

#### *Association between depression and poor oral health*

This was strongest among the Kurdish group as depression was significantly associated with poor oral health and perceived need for dental care among Kurdish men and women. Significant associations were found between depression and toothache /dental problems among Kurdish women only. In our study, the Kurdish group has a large proportion of refugee/ asylum seekers, high rates of unemployment (more than half our sample were unemployed), and low education (high school graduates were less than half). They also have the lowest frequency of tooth brushing. These baseline characteristics are shown in Table 2. We are not aware of any culture of silence on mental illness or reluctance to admit any form of mental health disorders among the Kurdish population, hence, the high depressive rates, high rates of utilization of mental health professional services and strong association observed in this group.

In the Russian migrant group, significant associations were found between depressive symptoms and self-reported oral health and having need for dental care only among the men. Our results are similar to that of a previous study among Finnish adults which found significant associations between depression and poor oral health among non-smoking men (Anttila et al., 2001). The Russian group is the most highly educated, employed and most integrated migrant group in our study, and is most similar in socio-demographic characteristics to Finnish adults.

No significant association between depression and any of our oral health variables was found among the Somali study population. We suggest that the reason for this lies both

in the low reported prevalence of depressive symptoms on one hand, and in stringent attention paid to oral hygiene, probably influenced by cultural and religious factors, on the other hand. In the light of the above information, we suggest that an artificially low prevalence of depressive symptoms as well as a culture of excellent oral hygiene might be responsible for the dearth of association between depressive symptoms and oral health in this particular group.

#### *Strengths and Limitations of the study*

Significant strengths of the study are the population-based study with a relatively large population size and high participation rates. Because of the large population size and high participation rates, we were able to analyze separate results for males and females. In addition, the study addresses a topic which has not been studied among migrants before (to the best of our knowledge). We studied three migrant groups which varied in background, culture, and socioeconomic status; thus allowing for comparison among the different groups.

A limitation of the study is that the results of this study cannot be extrapolated to the entirety of the migrant population living in Finland. The study does not represent the entire migrant population in Finland, but only applies to migrants of Russian, Somali and Kurdish origin living in Finland.

Another limitation of the study is that there was variation in participation rates among the various migrant groups in the study, with the lowest participation rates among the Somalis. The non-responders to the study were not replaced. The non-responders might have some particular socio-demographic properties that could explain why they did not participate; there could be some peculiarities in their mental health and oral health as well, hence this might have constituted some bias in the study. We have attempted to solve this problem of non-response bias by using the Inverse Proportional Weighting, which is commonly used for this purpose (Castaneda et al., 2012).

Self-reported measures on oral health were used in this study. Although self-report is an inexpensive tool that is commonly used to assess utilization of oral health care service, it can be heavily influenced by personal views and thus susceptible to bias (Bhandari & Wagner, 2006; Short, 2009). Clinical assessment ought to be the gold standard of

objective conclusion, as opposed to self-perception (Liu, 2010). Researchers have shown that self-perceived oral health status and needs are highly influenced by the subject's socioeconomic status, perception of oral health, psychosocial effects of oral health on quality of life, and general health status (Andrade, Lebrao, Santos, Duarte, & Teixeira, 2012; Locker, Clarke, & Payne, 2000; Lundegren, 2012; Ugarte et al., 2007).

A study in Israel showed a high rate of disparity between the actual clinically assessed oral health and self-perceived oral health as reported by the subjects of the study (Vered & Sgan-Cohen, 2003). Another study indicates that oral self-reported needs may be lower than actual clinical needs (Ghiabi, Matthews, & Brilliant, 2014). Self-perceived dental treatment need may also be more common among those with a high number of depressive symptoms (Anttila, Knuuttila, Ylostalo, & Joukamaa, 2006). These might introduce some form of bias in our study.

While the HCLS-25 symptom inventory is a widely respected and accepted self-report-screening tool for depressive symptoms, bias might arise in the course of self-report as we did in our study. Hence, the Harvard School of Public Health recommends that it should be administered by a trained mental health professional and is not to be used as a self-report (Harvard Program in Refugee Trauma, 2011). We are not aware of any changes in responses caused by weather using the HCLS-25 symptom inventory (Michalak et al., 2004). Finally, by nature of the study being a cross sectional study, it is not possible to establish a causal relationship in the association between depression and self-perceived oral health.

## **Conclusion**

We find that association between depression and poor oral health varies across different groups; culture and lifestyle habits may play an important role in influencing these associations. As a cross sectional study, we cannot infer a causal relationship. Mental health and oral health care providers need to take these important associations into cognizance to be able to provide better health care for migrants.

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## TABLES

Table 1. Items in the depression and anxiety subscales

Subscale	Items
Depression	Loss of sexual interest, feeling low in energy, suicidal thoughts, poor appetite, crying easily, feeling trapped or caught, blaming one's self for things, feeling lonely, feeling blue, worrying too much about things, loss of interest in things, difficulty falling asleep or staying asleep, feeling hopeless about the future, feeling everything is an effort, feelings of worthlessness
Anxiety	Nervousness or shakiness inside, trembling, being suddenly scared for no apparent reason, feeling fearful, heart pounding or racing, feeling tense or keyed up, spells of terror or panic, feeling restless; not able to sit still, headaches, faintness, dizziness or weakness

Table 2: Sociodemographic characteristics of the three different migrant groups by gender, mean (SE)<sup>1</sup> and n (%)<sup>2</sup>

	Russian (n= 692)		Somali (n=489)		Kurdish (n=614)	
	Men (n=253)	Women (n=439)	Men (n=218)	Women (n=271)	Men (n=326)	Women (n=288)
Age in years: mean (SE)	37.32 (0.89)	40.78 (0.62)	33.45 (0.82)	34.89 (0.73)	34.16 (0.54)	35.77 (0.54)
High school graduate, n (%)	171 (70.0)	347 (81.0)	69 (41.3)	40 (16.6)	137(43.7)	117(41.9)
Unemployed, n (%)	100 (41.6)	206(47.8)	138 (63.9)	222(83.6)	176(53.3)	197(68.9)
No of years lived in Finland: mean (SE)	11.78 (0.42)	12.32 (0.32)	12.15 (0.50)	11.93 (0.37)	10.4 (0.28)	11.41 (0.28)
Poor language proficiency in Finnish/Swedish, n (%)	37 (13.7)	40 (8.5)	23 (6.2)	80(27.7)	45 (12.0)	57 (19.9)
Refugee /asylum seeker, n (%)	2 (1.1)	2 (1.0)	130 (91.7)	103 (54.4)	234 (84.0)	144(63.1)
Obese (BMI $\geq$ 30), n (%)	21( 12.7)	49 (16.4)	8(2.9)	76 (35.4)	41 (14.3)	51(21.7)
Long-term illness, n (%)	64( 24.6)	164(40.1)	16(8.5)	49(21.2)	83(26.4)	87(30.1)
Bad, quite bad or average self-estimated health status, n (%)	67(23.1)	166 (38.5)	16(7.8)	42 (17.6)	82(25.5)	101(34.3)
Depressive symptoms, n (%)	17(12.0)	65( 23.5)	10(6.3)	26(12.5)	69(25.6)	118 (49.3)

Anxiety symptoms, n (%)	7(4.0)	67( 23.2)	9( 4.1)	22( 8.3)	68 (19.8)	190(42.5)
Somatic symptoms, n (%)	8( 4.4)	56( 19.9)	16(7.6)	56 (24.7)	52(20.3)	99( 41.3)
Poor (bad, quite bad, average) self-estimated oral health status, n (%)	92(48.0)	166(50.8)	18(12.8)	57( 36.4)	132(47.4)	112(48.4)
Dental/denture problems/12 months, n (%)	108 (45.00)	202(47.4)	53(24.5)	99 (41.2)	162( 49.1)	164(58.4)
Need for dental care, n (%)	89 (50.2)	178(54.2)	67(39.7)	119( 68.9)	176(62.2)	155( 67.3)
Number of teeth present : mean (SE)	27.41 (0.35)	26.96 (0.24)	30.21 (0.17)	28.46 (0.25)	27.30 (0.22)	27.38 (0.19)
Frequency of tooth brushing at least twice/day, n (%)	139 (73.00)	302 (88.1)	150 (99.8)	180 (97.8)	175 (63.68)	185 (80.83)
Use of mental health services /12 months, n (%)	14 (5.28)	33 (7.10)	4 (1.40)	6 (2.06)	20 (6.94)	56 (19.21)

<sup>1</sup>(SE) = standard error

<sup>2</sup> n (%) = figures in numbers, (prevalence in percentage)

All results have been weighted to account for non-response bias and difference in responses between various population groups.

Table 3: Odds ratio for oral poor self-estimated oral health, perceived need for dental care and toothache/ denture problems in last 12 months in depressed subjects<sup>1</sup> compared to non-depressed subjects.

	<b>Russian</b>		<b>Somali</b>		<b>Kurdish</b>	
	OR <sup>2</sup> (95% CI) <sup>3</sup>		OR (95% CI)		OR (95% CI)	
	Men	Women	Men	Women	Men	Women
<b>Poor self-estimated oral health status</b>						
Model 1 <sup>4</sup>						
No depression	<b>1.00</b>	<b>1.00</b>	1.00	1.00	<b>1.00</b>	<b>1.00</b>
Depressive symptoms	<b>5.19</b> <b>(1.31-20.63)</b>	<b>1.92</b> <b>(1.05-3.50)</b>	1.60 (0.31-8.33)	1.88 (0.73-4.82)	<b>1.70</b> <b>(1.04-2.76)</b>	<b>2.83</b> <b>(1.80-4.44)</b>
Model 2 <sup>5</sup>						
No depression	<b>1.00</b>	1.00	1.00	1.00	<b>1.00</b>	<b>1.00</b>
Depressive symptoms	<b>6.73</b> <b>(1.81-25.03)</b>	1.67 (0.89-3.14)	2.03 (0.37-11.18)	1.81 (0.71-4.65)	<b>1.72</b> <b>(1.03-2.88)</b>	<b>2.20</b> <b>(1.37-3.53)</b>
Model 3 <sup>6</sup>						
No depression	<b>1.00</b>	1.00	1.00	1.00	<b>1.00</b>	<b>1.00</b>
Depressive symptoms	<b>8.10</b> <b>(2.05-32.05)</b>	1.15 (0.57-2.33)	2.06 (0.35-12.14)	1.73 (0.63-4.72)	<b>1.69</b> <b>(1.09-2.85)</b>	<b>2.07</b> <b>(1.20-3.57)</b>
<b>Toothache/ denture problems in last 12 months</b>						
Model 1						
No depression	1.00	1.00	1.00	1.00	1.00	<b>1.00</b>
Depressive symptoms	2.52 (0.80-8.10)	1.49 (0.82-2.70)	1.01 (0.26-3.87)	1.33 (0.56-3.17)	0.94 (0.59-1.50)	<b>1.99</b> <b>(1.29-3.07)</b>
Model 2						
No depression	1.00	1.00	1.00	1.00	1.00	<b>1.00</b>
Depressive symptoms	2.54 (0.80-8.10)	1.52 (0.83-2.82)	1.29 (0.32-5.27)	1.32 (0.57-3.19)	0.91 (0.56-1.49)	<b>2.02</b> <b>(1.29-3.13)</b>
Model 3						
No depression	1.00	1.00	1.00	1.00	1.00	<b>1.00</b>
Depressive symptoms	2.13 (0.64-7.12)	1.05 (0.54-2.04)	1.38 (0.33-5.81)	1.26 (0.47-1.30)	0.79 (0.48-1.30)	<b>1.73</b> <b>(1.05-2.84)</b>



Perceived need for dental care						
Model 1						
No depression	<b>1.00</b>	1.00	1.00	1.00	1.00	<b>1.00</b>
Depressive symptoms	<b>6.75</b> <b>(1.80-25.32)</b>	1.81 (0.98-3.33)	0.49 (0.14-1.74)	2.22 (0.72-6.83)	1.66 (0.99-2.78)	<b>2.54</b> <b>(1.56-4.12)</b>
Model 2						
No depression	<b>1.00</b>	1.00	1.00	1.00	1.00	<b>1.00</b>
Depressive symptoms	<b>7.29</b> <b>(1.90-27.94)</b>	1.70 (0.91-3.16)	0.57 (0.16-2.00)	2.16 (0.69-6.73)	1.66 (0.99-2.78)	<b>2.20</b> <b>(1.34-3.61)</b>
Model 3						
No depression	<b>1.00</b>	1.00	1.00	1.00	<b>1.00</b>	<b>1.00</b>
Depressive symptoms	<b>7.32</b> <b>(1.68-32.14)</b>	1.81 (0.93-3.52)	0.39 (0.09-1.65)	2.40 (0.74-7.80)	<b>1.72</b> <b>(1.00-2.98)</b>	<b>2.19</b> <b>(1.26-3.83)</b>

<sup>1</sup>HSCL-25 (Hopkins Symptom Checklist -25), depression subscale, cut-off point > 1.75

<sup>2</sup>OR = odds ratio, figures in bolded cases show significant associations

<sup>3</sup>95% CI= 95% confidence interval

<sup>4</sup>Model 1= unadjusted model

<sup>5</sup>Model 2= adjusted for age

<sup>6</sup>Model 3= adjusted for age, basic education, employment, Finnish/Swedish language proficiency and presence of long-term illness (injuries and / or at least one of the following self-reported diseases ever diagnosed by a physician: cardiovascular disease (coronary artery disease, high blood pressure) diabetes, asthma, chronic bronchitis, knee osteoarthritis or hip osteoarthritis.

## 6. APPENDICES

### (i.) Extract of the oral health examination questions (in Finnish)

THL – Raportti 63/2012

Maahanmuuttajien terveys ja hyvinvointi

343

Oletteko viimeksi kuluneiden 12 kuukauden aikana käyttänyt kertaakaan mitään seuraavista:

D704A - D704D.	Ei	Kyllä
D704A. Ilman lääkärin reseptiä apteekista saatavaa lääkettä?	0	1
D704B. Vitamiini- tai kivennäisainevälitteitä?	0	1
D704C. Luontaislääkkeitä, luonnolääkkeitä, yrtti- tai rohdosvalmisteita?	0	1
D704D. Homeopaattista tai antroposofista valmisteita?	0	1

D704E. Jos vähintään yhteen D704A-D704D +1, kysytään D704E(1) +.

Minkä nimiset valmisteet Teillä on nykyisin tai täällä hetkellä käytössä?

D704A - D704D. Lääkkeen nimi

.....  
.....  
.....

#### E. SUUN TERVEYS

E01. Onko hampaidenne kunto ja suunne terveydentila mielestänne nykyisin:

- 1 hyvä
- 2 melko hyvä
- 3 keskitasoinen
- 4 melko huono
- 5 huono?

E02. Onko Teillä viimeksi kuluneiden 12 kuukauden aikana ollut hammasärkyä tai muita hampaitiin tai hammasproteeseihin liittyviä valvoja?

- 0 Ei
- 1 Kyllä

E03. Onko Teillä irrotettavat hammasproteesit?

- 1 Kokoproteesit (ei omia hampaita eikä hampaiden juuria)
- 2 (Osia)proteesit ja hampaita
- 3 Ei hammasproteeja, on hampaita
- 4 Ei proteeja eikä hampaita

E04. Kuinka usein yleensä harjaatte hampaanne?

- 1 Useammin kuin kaksi kertaa päivässä
- 2 Kaksi kertaa päivässä
- 3 Kerran päivässä
- 4 Harvemmin kuin joka päivä
- 5 Ei koskaan

E05. Onko Teillä tapana käydä hammaslääkärissä:

- 1 säännöllisesti tarkastusta varten
- 2 vain silloin, kun Teillä on särkyä tai jotakin valvua
- 3 ei koskaan

E06. Milloin viimeksi kävitte hammashoidossa?

- 1 Edellisen 12 kk aikana
- 2 1-2 vuotta sitten
- 3 3-5 vuotta sitten
- 4 Yli 5 vuotta sitten
- 5 En ole koskaan käynyt hammashoidossa ➔ P101

D705. E07 - E11 kysytään vain jos E05=1-4

E07. Kuinka monta kertaa olette käynyt hammashoidossa Suomessa viimeksi kuluneiden 12 kk:n aikana? Laskekaa mukaan kaikki käynnit:

..... kertaa

D706. E07\_1 kysytään vain jos E07=1 tai enemmän

E07\_1. Kuinka monta kertaa näistä oli hammaslääkärin vastaanotolla?

..... kertaa

E08. Entä kuinka monta kertaa kävitte hammashoidossa ulkomailla viimeksi kuluneiden 12 kk:n aikana?

..... kertaa

D707. E08 kysytään vain jos E07\_1 = 1 tai enemmän eli käynyt Suomessa hammaslääkärin vastaanotolla viimeksi kuluneiden 12 kk aikana

E08. Kun miehistä viimeistä käyntiänne hammaslääkärin vastaanotolla Suomessa, miten samaa mieltä olette seuraavista:

E09A - E09E.	täysin samaa mieltä	osittain samaa mieltä	ei mieltä
E09A. Pääsin hoitoon riittävän nopeasti	1	2	3
E09B. Sain riittävästi tietoa terveydentilastani	1	2	3
E09C. Minua kuunneltiin ja minua kohtaan osoitettiin kiinnostusta	1	2	3
E09D. Puhdin vaikuttamaan hoitoani koskeviin päätöksiin	1	2	3
E09E. Samastani hoitosta oli minulle apua	1	2	3

E10. Arveletteko nyt tarvitsevanne hammashoitoa?

- 0 Ei
- 1 Kyllä

E11. Onko hammaslääkärissä käynti mielestänne:

- 1 ei lainkaan pelottavaa
- 2 jonkin verran pelottavaa
- 3 erittäin pelottavaa?

40

41

LIIKET

(ii) Extract of the Hopkins Symptom Checklist-25 (HSCL-25) in English

MAAMU : Health examination: HSCL (Hopkins Symptom Checklist)		Not at all	A little	Quite a bit	Extremely
Listed below are some symptoms of strain that people sometimes have.					
For the past 7 days, how much were you bothered by:					
1	Headaches	1	2	3	4
2	Nervousness or shakiness inside	1	2	3	4
3	Faintness, dizziness or weakness	1	2	3	4
4	Loss of sexual interest or pleasure	1	2	3	4
5	Feeling low in energy (or) –slowed down	1	2	3	4
6	Thoughts of ending your life	1	2	3	4
7	Trembling	1	2	3	4
8	Poor appetite	1	2	3	4
9	Crying easily	1	2	3	4
10	Feeling (of being) trapped or caught	1	2	3	4
11	Suddenly scared for no reason	1	2	3	4
12	Blaming yourself for things	1	2	3	4
13	Feeling lonely	1	2	3	4
14	Feeling blue	1	2	3	4
15	Worrying too much about things	1	2	3	4
16	Feeling no interest in things	1	2	3	4
17	Feeling fearful	1	2	3	4
18	Heart pounding or racing	1	2	3	4
19	Difficulty in falling asleep or staying asleep	1	2	3	4
20	Feeling hopeless about the future	1	2	3	4
21	Feeling tense or keyed up	1	2	3	4

22	Feeling everything is an effort	1	2	3	4
23	Spells of terror or panic	1	2	3	4
24	Feeling so restless, (you couldn't) can't sit down	1	2	3	4
25	Feelings of worthlessness	1	2	3	4